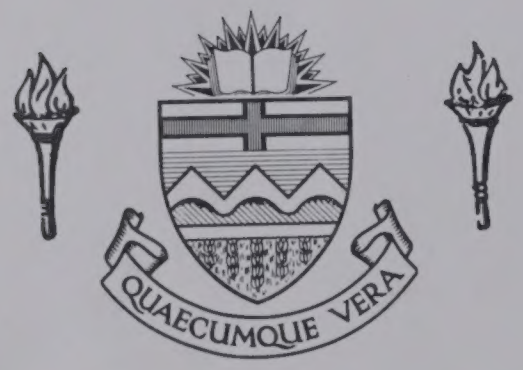

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THE UNIVERSITY OF ALBERTA

A COMPARATIVE STUDY OF PERCEPTUAL-TASK PERFORMANCE OF INDIAN AND MIDDLE-CLASS CHILDREN

by

Donald W. Rhodes

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

FEBRUARY, 1968

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ABSTRACT

A COMPARATIVE STUDY OF MEDIATIONAL-TASK PERFORMANCE
OF INDIAN AND MIDDLE-CLASS CHILDREN

by Donald W. Knowles

Performances of Indian and middle-class children on tasks purported to call for mediating response were compared to examine deficits hypothesized as being associated with disadvantaged experiential background and slow linguistic development. Ninety Indian children were selected from a population of eight-year-olds attending two Indian reservation schools. Indian Ss were randomly assigned to one of three groups (Indian control, experimental A, and experimental B). Thirty eight-year-old children from an educationally-advantaged urban area were selected as the comparative group (middle-class control).

The first of three studies compared performance of Indian and middle-class control groups on two mediational tasks--optional reversal shift (ORS) and transposition. The ORS data supported the premise that children from a culturally-different environment, which is characterized by a lack of verbal experience, tend to display a retarded development of mediating responses in a concept acquisition task. No significant differences between Indian and middle-class groups on transposition task performance were found.

In the second study experimental Indian groups were given mediational tasks under conditions which elicited overt verbal responses

prior to choice response. ORS performance of Indian experimental Ss was significantly better than that of Indian control Ss. Findings were taken as supportive to the facilitative effect provided concept-acquisition tasks by lowering the "arousal threshold" of verbal involvement. Transposition task performance was not, however, affected by experimental treatment.

The third study examined relationships between mediational task performance and linguistic development. ORS performance was related to vocabulary scores but transposition performance was not. Complexity index score, which indicated syntactical complexity, was not related to mediational task performance. The crucial language factor associated with task performance appeared to be ease of verbal involvement, examined in Study 2, rather than general linguistic development.

Results from the present study were considered with findings of recent research in evaluating the two mediational tasks--ORS and transposition. Data did not support consideration of the transposition procedure used in the present study as an indicator of mediation. The ORS appeared to be a more valid measure.

The results suggest that the general approach employed in this study leads to valuable observations about culturally-different children. In addition to slower development in the use of English, the Indian student appears to be handicapped even in problems not calling for verbal comprehension or expression because of slower development of mediational responses.

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CHAPTER 1

STATEMENT OF PROBLEM

The native Indian population in Canada manifests many of the difficulties in school learning tasks exhibited by "culturally disadvantaged" students studied elsewhere. Limited education of parents, unfamiliarity with time schedules, multiplicity of dialects, and crowded home conditions have characterized the environment of many Indian children. A disproportionately small number of Indian students attain more than grade eight standing. Although marked improvement has occurred in Indian education during the last twenty years, only 12% of the total student population in Alberta in 1964-65 were in grades nine to twelve (Fisher, 1966). Less than one percent of all Indian students progressed as far as grade twelve (Waller, 1965).

A contributing factor to this serious attrition would appear to be the existence of a gap between the level of readiness expected for school tasks and the specific abilities possessed by Indian children. The environmental stimulation provided by many Indian reserve homes could be considered as inadequate and inappropriate preparation for much of what goes on in school. In addition to lack of knowledge content, Indian students possibly have deficits in the processes of using information in problem solutions. Symbolic thought behavior, in particular, could be retarded. Since much advanced schooling and technological training presupposes possession of abstract conceptual abilities, the Indian student might very well be at a disadvantage in meeting the demands of programs.

The present study considered the hypothesis that development

of mediational behavior in Indian students is retarded as a result of relative verbal impoverishment. Mediational behavior is characterized by the presence of mediational responses which covertly direct behavior and assist learning. Performance of Indian students on two types of mediational tasks was compared to performance of children from educationally advantaged backgrounds. To specify the nature of any observed cultural differences, differential performance on the mediational tasks was related to verbal behavior as measured by Language tests and by an experimental verbalizing treatment.

Although many educators and psychologists have stated that disadvantaged children perform at a concrete, nonmediational level because of unfamiliarity with verbal approaches to problems, few empirical studies have been reported. The relationship between verbal behavior and mediational task performance has generally been studied by examining posttest explanations. Some promising work has been done in studying the effect of overt verbalization but not within the context of cultural disadvantagement. Consideration of the role of differences in language development in mediational task performance has been neglected by most researchers. An empirical test of these presumed relationships between language and mediation appeared to be warranted both to investigate the nature of cultural disadvantagement and to evaluate the mediational tasks.

The present research consisted of three studies which related cultural differences in mediational test behavior to verbal factors. The first compared mediational test performance of Ss from culturally different backgrounds -- Indian reserve and urban middle-class. The second dealt with effects of an experimental verbalizing procedure in assisting Indian students to overcome mediational deficiencies. The third study

compared the language development of mediating and nonmediating Ss as indicated by performance on the tasks. Discussion of related studies, method, and specific results followed this three-stage format.

CHAPTER II

THEORETICAL ORIENTATION AND REVIEW OF RESEARCH

Theory of the Present Study

Several recent studies have found an association between experiential background, generally as indicated by socioeconomic status (SES), and the development of abstractive thinking. John (1963) found that lower-class children were surpassed by higher-class children on measures of labeling and categorizing behavior. Higgins and Silvers (1958) found that Negro children of low SES background showed poor performance on both the Stanford-Binet Intelligence Scale, recognized as being heavily dependent on verbal facility, and Raven's Colored Progressive Matrices, purportedly non-socially biased.

The critical effect of disadvantaged environments is often of a verbal and conceptual nature (Bernstein, 1965; Deutsch, 1963; Taba, 1966; and Whiteman, 1965). Prehm (1966) has shown, for instance, that verbal pretraining leads to significantly improved performance on concept acquisition tasks among a lower SES group of four to seven year olds. Several factors in the disadvantaged child's environment appear to contribute to the deficiency of verbal abstractive skills (Ausubel, 1965). The home characteristically lacks a variety of objects and utensils that require labeling and serve as referents for language acquisition. A minimum of verbal interchange takes place to provide corrective feedback to shape pronunciation and grammar. The language model provided is frequently faulty and is particularly inadequate in terms of the number of

abstractions it presents. The transition from concrete to abstract modes of thought is retarded and incomplete in many children as a result. Ausubel has described the implications of this poor development on the problem-solving performance of children.

> Because concrete thought operations are necessarily more time consuming than their abstract-verbal counterparts, and also because of his distractibility, unfamiliarity with formal language, impaired self-confidence, and unresponsiveness to time pressure, the culturally deprived child typically works more slowly than the middle-class child in an academic setting (Ausubel, 1965, p. 10).

More specifically, the disadvantaged child may be handicapped by slow development of the covert function of language in directing behavior and assisting learning. The covert, mediating function of language is considered to develop once facility with the vocabulary aspects has been attained (Luria, 1957). Thus, attainment of certain communication skills is seen as a necessary condition for the development of verbal mediation. In addition, Jensen (1966) has hypothesized the existence of an "arousal threshold" of mediating responses which concerns the tendency for verbal mediators to be elicited by particular stimuli. The threshold is related to "the amount of practice in, and reinforcement of, verbal learning behavior and other forms of verbal coping with the environment (Jensen, 1966, p. 104)." The disadvantaged child is less predisposed to attempt a verbal approach particularly in situations which are not strongly associated with words. For example, Jensen (1966) has observed a lack of verbalization among lower-class children on Raven's Progressive Matrices as compared to the spontaneous application of words shown by middle-class agemates.

A marked characteristic of the home and community environment

of the Indian child is the restrictiveness of language experiences. Homes on reserves offer little verbal stimulation; few reading materials are available; parents generally have only elementary school education; and interaction between children and adults, particularly those adults who might serve as adequate language models, is minimal. On the basis of studies of similarly disadvantaged groups of children, it was postulated that Indian children show deficits in their language development and are retarded in their acquisition of the covert, mediating functions of language.

No previously-published studies appear to have considered concurrently both the overt and mediational functions of language of culturally-different children despite tacit assumption of the existence of a strong relationship. It was the purpose of the present study to investigate the performance level of Indian children in certain basic verbal areas while examining some of the assumptions of mediational tasks. To accomplish this purpose, the related literature was reviewed and two types of mediational tasks were developed. An experimental verbalizing treatment was also developed to specify the nature of differential performance on these mediational tasks. Finally, measures of language development were selected to permit a description of overt language skills in relation to mediational task performance.

The study was based on the theoretical formulation that retarded development of communication skills, as indicated by overt language performance, would hamper acquisition of the mediating function of language in covertly directing behavior and assisting learning even in tasks not calling for verbal expression. A relative inability to apply words to such non-verbal tasks (i.e., a high arousal threshold of verbal mediation)

was considered to be an important aspect of this difficulty in verbal mediation. An experimental program which encouraged the application of words to the tasks (i.e., which lowered the arousal threshold) was therefore considered to provide compensation to the linguistically-retarded group.

Procedures for the Study of Mediational Behavior

The investigation of mediating responses has been conducted by a variety of experimental procedures. A number of these procedures, such as the mediated paired-associate approach (Davidson, 1964) and syntactical mediation (Jensen, 1966), require expressive skills which are not necessarily present in young, culturally-different children. Two procedures, transposition and reversal shift, were considered particularly appropriate for the present study because of their minimization of verbal communication. Both tasks could be presented to subjects with few verbal instructions and responded to without using words. Studies employing these procedures were reviewed and adaptations made to meet the requirements of the present study.

The Reversal Shift Procedure

Reversal-nonreversal shift learning requires S to discriminate between two stimuli which differ simultaneously on two dimensions (e.g., size and brightness). Once the initial discrimination is learned, S is required to shift his manner of responding to either a reversal shift (selecting from an opposite value on the initially-relevant dimension) or a nonreversal shift (selecting a value from the previously irrelevant dimension). The Kendlers (1962) have attempted to explain success or failure on each of these shifts on the basis of the development of mediating

responses. They suggest if mediating responses are available the reversal shift is easier since the mediating response for a particular dimension continues to be appropriate and only the overt response must be changed. By comparison, nonreversal shift learning requires that both the mediating response and the overt response be changed since the initial dimension does not maintain its relevance. If, however, the learner is responding in a nonmediational way the nonreversal shift is easier since it affects less associations between stimulus and response than the reversal (Goss, 1961). The reversal shift would require the nonmediator to replace responses which have previously been nonreinforced for responses which have been reinforced. In the nonreversal shift the newly correct and incorrect habits have been reinforced equally often so that single-unit S-R associations should be easier.

A series of experiments by Harrow and Friedman (1958), Buss (1953), and Kendler and D'Amato (1955) indicated that college students execute a reversal shift more rapidly than a nonreversal shift. Experimentation with young children (Kendler and Kendler, 1959) showed that, when considered as a group, kindergarten children learn the two types of shift at approximately the same rate. When the children were considered as fast or slow learners on the basis of initial discrimination learning, it was found that fast learners performed better on the reversal shift than the nonreversal. The slow learners showed greater success with the nonreversal shift. The differential performance of the two groups appeared to indicate that fast learners were using a mediational approach, slow learners a single-unit, nonmediational approach.

The inferred developmental effect on the acquisition of

mediational responses was studied by Kendler, Kendler, and Learnard (1962). The experimental procedure was changed to that of "optional shift learning" which allowed S to respond in either a reversal or non-reversal manner once the initial discrimination had been learned. The choice was assumed to indicate S's characteristic type of approach - mediational or nonmediational. As hypothesized, the proportion of children who responded in a reversal manner increased gradually from 37.5% at age three to 62.5% at age ten.

The optional reversal shift (ORS) appeared to be particularly meritous for the present study because of its feature that each S learned in the procedure; it was the way he learned that discriminated between levels of performing. Procedures in which Ss passed or failed did not provide a description of the learning of both groups. In addition, the ORS procedure eliminated effects of partial reinforcement inherent in the reversal-nonreversal method (Kendler, et al., 1962).

The Transposition Procedure

The transposition task requires S to transfer a learned differential response to a new combination of stimulus objects differing on the initially-relevant dimension. For instance, S trained to choose the larger of two squares (e.g., areas one square inch and two square inches) is given a test pair involving one of the previously-used squares and a new square (e.g., two square inches and three square inches). Older children and adults have been found to choose the larger square in the test pair; younger children the same square chosen in learning trials (Jensen, 1966). In test situations in which the test pair consists of two new squares (e.g., four square inches and five square inches) the

developmental difference has been found to be even more pronounced. Older Ss consistently choose the larger square; younger Ss respond in a random manner.

The early transposition studies of Jackson, et al., (1938, 1940) attempted to systematically investigate the procedure; more recent studies have been concerned with particular aspects of transposition. Kuenne (1946) adapted the task for use with children and considered the role of verbal mediation. Children of mental ages three to six years were trained to choose the smaller of two squares, approximately 40 square inches and 68 square inches, then given a test pair measuring 2 square inches and 3.6 square inches. Only the children of older mental ages responded consistently to the smaller square of the test pair. A correlation of .66 (n=44) was found between the number of relative responses (i.e., to the smaller square) and mental age score on the Stanford-Binet Intelligence Scale. The superior performance of the more mature learner was attributed to the use of verbal mediators.

The task has been made more difficult by increasing the number of stimuli to three. Stevenson and Iscoe (1954) found that only 60% of Ss 9 to 14 years of age consistently gave relative responses in the three-stimulus situation. These researchers also modified the procedure so that each S was given two transposition tasks after initial learning. The first task consisted of substituting one of the three stimuli with a new stimulus which became the correct relative choice ("near" task). The second task ("far" task) utilized two different stimuli, chosen from the opposite end of the size continuum, together with one of the original stimuli. Five boxes, differing in size by a constant ratio, were used.

Boxes 2, 3, and 4 were used in initial training with Ss being required, for example, to select Box 4. Once criterion was attained, the "near" task was given using Boxes 3, 4, and 5, the latter of which became the "relatively" correct one. When criterion was met, the "far" task using Boxes 1, 2, and 3 was presented. Significantly more adequate posttest explanations were given by Ss who responded in a consistently relative way than were given by nonrelative responders. Appropriate explanation of transpositional behavior was assumed to indicate that Ss had abstracted the basis of choice, thereby using a mediator to guide overt behavior.

A further modification was suggested by Jensen (1966). The Stevenson and Iscoe procedure was amended by a test series which presented three boxes of identical size each bearing the picture of an animal. The animals pictured were a mouse, a horse, and an elephant. Kindergarten and first grade children were reported to have responded in a random manner; third and fourth graders consistently chose the elephant. The older children were apparently capable of transposing from earlier trials in which they had learned to choose the largest of the three boxes. The differential behavior of the two groups was consistent with the hypothesized development of mediational behavior.

The increase in difficulty arising from the use of three stimuli, instead of two, was considered important for the present study which was concerned with the possibility of statistically significant improvements in performance. Other transposition procedures tended to produce a ceiling-effect problem when used with the age group selected for the present study. Jensen's use of pictures was similarly attractive since it employed stimuli of approximately the same complexity as that presented

by many classroom materials.

The modified transposition procedure appeared to have important similarities to the ORS procedure. Differential performance by Ss on both tasks has been explained by the presence or absence of mediational responses. The nonmediator, responding in a single-unit manner to the stimuli, would be expected to prefer the nonreversal shift in the ORS and would not make relative responses in the transposition task. The mediator, using language or some other symbolic representation to organize stimuli and direct his behavior, would be expected to choose the reversal shift and the relative stimulus on the ORS and transposition tasks, respectively.

Experimental Verbalization Studies

The effect of overt verbalizations on reversal, transposition, and similar tasks has been studied by several approaches. The facilitating effect of language on discrimination learning was shown in Pyles' (1932) classic study with nursery and first grade children. Children discriminated more successfully among five vague shapes when nonsense-word labels were assigned to the forms. Even more rapid discrimination resulted when the five shapes were changed to familiar animal shapes for which the children could provide names. Some transfer to the no-name task was found when it was preceded by either or both of the naming tasks.

Weir and Stevenson (1959) examined the effect of children's ability to respond consistently to the "correct" member of pairs of animal pictures. Significantly more correct responses were given by Ss required to tell the examiner the name of the animal they were going to choose. The hypothesis that the facilitating effect of overt verbalization

would decrease as age increased from three to nine years (due to the presence of implicit, covert verbalizations in older children) was not supported, apparently because of the task's simplicity. The researchers found that the older children developed elaborate strategies which reduced their performance to that of younger children. Despite the inconsistent age effect, the verbalizing group was more successful than the noninstructed group at each age level.

Verbalizing instructions have been found to increase the frequency of transposition in both "near" and "far" tasks in a procedure calling for S to select the intermediate size of three stimuli (Reese, 1966). Either of two types of instructions, "It's under the medium one" and "It's not under the big one or the little one," were found to be facilitative. Unfortunately, in addition to requiring S to bring words to the task, instructions of this type provided extra information about the nature of the task. In contrast to control group Ss, instructed Ss were told precisely which stimulus was correct and which dimension was relevant.

Using the ORS procedure, Kendler (1964) found that overt verbalization was associated with an increase in the number of reversers in a group of kindergarten children. The experimental group was provided with a phrase such as, "The white is the winner and the black is the loser." The number of reversers in the experimental group was double that of the control group. Furthermore, the initial discrimination was learned with significantly fewer trials by the experimental group. The overt verbalization was considered to have served as a mediator in the responses of young children in the same role fulfilled by hypothesized covert

responses among more mature learners.

A marked problem in the use of verbalizing treatments has been to control the specific assistance provided. Many treatments confounded directions to bring words to problem solution with additional information about the elements and purposes of the procedure. A double advantage was thus provided experimental Ss confusing the interpretation of any improvement in performance. The present study made use of a procedure that attempted to lead Ss to apply words in their solutions without experimentally providing labels and other descriptions.

Language Ability and Mediational Behavior

Language performance has received increased study in response to such formulations as Bernstein's (1965) which stress the role of language in understanding and organizing one's environment. Three major approaches have been taken to examine the relationship between language ability and performance in concept-attainment and problem-solving tasks. The first has been to study the effect of experimental verbalization treatments on mediational tasks such as in the work of Reese (1966) and Kendler (1964) reviewed previously.

The second approach has been to correlate performance on language measures with test scores on other tasks. Very few studies since the early work of Kuenne (1946) have employed the correlational approach. Kuenne (1946) found a significant correlation ($r=.66$, $n=44$) between number of transpositional responses and mental age score on the Stanford-Binet, essentially a test of verbal ability.

A third approach has considered the relationship between post-test explanations and overt test behavior. Stevenson and Iscoe (1954)

found that children who correctly explained the basis of their response had given more relative responses to the transposition task than children who could not provide a verbal explanation. The Kendlers (1962) found a relationship between mediational behavior on the ORS and correct verbal explanations. A large proportion (42%) of the children who performed in an inconsistent way on the ORS task were unable to produce any relevant explanation even when the stimulus cards were in view. These researchers concluded that "the development of the mediational process is intimately related to the development of the ability to relate words to actions (Kendler, et al., 1962, p. 583)." There is, however, an inherent danger in relying heavily on explanations elicited after performance since conditions which did not exist during the task (e.g., specific questioning) serve to maximize verbal response. Some Ss may attempt to use words only upon specific prompting and the resulting explanations may bear little relationship to their role during the task.

Investigations of Language Behavior

Studies of the effects of social and economic disadvantagement, notably those of the Institute for Developmental Studies (Deutsch, 1965; John, 1963; Whiteman, 1965), have included descriptions of language development. The importance of considering language behavior was explained by Deutsch.

> This (emphasis) was not only because language is the primary avenue for communication, absorption, and interpretation of the environment, but because it also reflects highly acculturated styles of thought and ideational modes for solving and not solving problems (1965, p. 79).

A verbal survey (Deutsch, 1965) of lower SES children was conducted by means of various standardized vocabulary measures, including the

vocabulary subtest of the Wechsler Intelligence Scale for Children (WISC) and the Peabody Picture Vocabulary Test (PPVT). Correlations between language measures and an index of SES (based on occupational prestige and educational attainment of parents) ranged from r=.22 to r=.49 for both first- and fifth-graders (n=127 and n=165, respectively).

Further support to the existence of a relationship between language development and experiential background has been provided by Whiteman (1965). A measure of home environment called the Deprivation Index was found to account for a significant portion of variance in WISC vocabulary scores. John (1963) found that a critical deficiency associated with social class and race was in use of the abstractive function of language.

Carson and Rabin (1960) provided a fuller study of language development by examining comprehension and communication skills of white and Negro children. Verbal comprehension, the ability to understand others, was measured by the Ammon's Picture Vocabulary Test. Verbal communication, or expressive ability, was measured by examining definitions given in the WISC vocabulary subtest. Significant associations were found between language measures and cultural group. Negro children were particularly deficient in communication skills.

Despite careful study of vocabulary skills, researchers of disadvantaged groups have neglected the study of other areas of language behavior. A particularly important omission has been the study of syntax, a relatively complicated area generally approached only by linguists. A recent survey by Loban (1963), however, made use of an index that could be used by nonspecialists in the language area. The S's oral descriptions

of several pictures are recorded for analysis of average length of "communication unit" (one complete predication). A close approximation to more complex analyses of syntax is provided by this index.

The importance of considering the language behavior by culturally different children was clearly stated by John and Goldstein (1964).

> The child whose language acquisition is characterized by active participation with a more verbally mature individual not only develops greater verbal proficiency--as a result of being listened to and corrected--but also is more likely to rely on, and use effectively, words as mediators. Language is a socially-conditioned relationship between the child's internal and external worlds. Once able to use words as mediators, the child can effectively change his own social and material reality (John and Goldstein, 1964, p. 273).

The link between verbal proficiency and mediational behavior was thus assumed to be crucial to understanding the nature of disadvantagements experienced by culturally-different children. The relationship between the language behavior of children in the present study to their mediational behavior was considered worthy of investigation both to provide a fuller description of the group and to examine the hypothesized link.

Purpose of the Present Study

The present study examined the mediational behavior of Indian children in relation to their language ability. The general purpose was to test the assumption that associated with the Indian child's lack of verbal facility is a retardation in the use of words as mediators.

Two types of mediational tasks were selected primarily on the double criteria of (a) appropriateness for the age group, and (b) minimization of verbal communication requirements. The ORS procedure (Kendler and Kendler, 1966) and a modification of the transposition procedure (Stevenson and Iscoe, 1954) were developed for use with young Indian

school children and an urban control group.

To help specify the nature of any observed deficits in performance, a verbalizing treatment was given two experimental groups of Indian children. The essential task of the treatment was to encourage each S to bring words to the ORS or transposition task.

The study attempted to consider the relationship between differential performance on the mediational tasks and language ability. Standardized measures of vocabularly were administered to specify receptive and expressive facility (John and Goldstein, 1964). An index of syntactical complexity was obtained by analysing the length of "communication unit" in oral descriptions of pictures (Loban, 1963). The scores on these measures of vocabulary and syntax were compared to performance on mediational tasks.

The present study thus investigated the mediational behavior of Indian children, compared to that of "advantaged" children, and the relationship between mediational behavior and verbal skills. To clarify the pursuit of these purposes, three studies were formulated to deal with (a) performance on mediational tasks, (b) effect of verbalizing treatment, and (c) relationship between language scores and mediational performance.

CHAPTER III

PROCEDURE AND SPECIFIC RESULTS

Sample

Subjects for the study were chosen from two schools within the Alberta region of the Department of Indian Affairs and from a school of the Edmonton Public School Board located in a middle-class area. The Indian sample was drawn randomly from a population attending Ermineskin School, Hobbema and Gooderham School, Duffield. Both schools are on reservations within a sixty-mile radius of Edmonton and serve Indian children of Cree background. The middle-class sample was drawn randomly from Meadowlark School which serves children whose parents have above-average income level, educational attainment, and occupational level (Scott, 1965).

The selection of age level was guided by the hypothesized development of mediational responses. It was decided to select a sample from the mid-point of the age range five to ten years set by the Kendlers (Kendler, Kendler, and Learnard, 1962) as defining the acquisition of mediational responses. Children who were eight years of age as of May 1, 1967 were selected. Numbers were assigned to all eight-year-olds in the middle-class and Indian schools and assignment made to control and experimental groups following a table of random numbers. Equal numbers of males and females were assigned to each of the four groups. Mean ages of Ss in each group, shown in Table 1, did not differ significantly ($F=0.99$, $df=3, 116$, $p=.399$).

To ensure that only Ss of at least average intellectual

ability, in a general sense, were included in the study, students scoring below the average range on the Visual Motor Gestalt Test, using the Development Bender Scoring System (Koppitz, 1964), were omitted from the study. Interjudge reliability on this measure is reported as $r > .88$ (Koppitz, 1964, p. 12). Koppitz presents support for the use of this test with culturally-different children to rule out mental retardation or perceptual problems associated with neurological impairment. Three Ss from the Indian group were omitted on this basis and were replaced by random assignment from the previously nonassigned group. All urban middle-class Ss met this criterion. Error scores of Indian Ss tended to be greater than those of urban middle-class Ss (Table 1) but the difference did not reach statistical significance ($F=2.43$, $df=3, 116$, $p=.069$).

Indian Ss had spent significantly less time in school than their urban middle-class agemates. Indian Ss were in grades one, two, and three; urban middle-class Ss in grades two and three. None of the students in the sample had been retained in a grade. The difference in mean years of schooling, shown in Table 1, was statistically significant ($F=9.44$, $df=3,116$, $p < .001$). In addition, the attendance of urban middle-class Ss in the current school year was significantly better than that of Indian Ss ($F=4.68$, $df=3,116$, $p=.004$). Absences among Indian Ss were somewhat reduced by the presence of residential students, one-third of the sample, whose attendance was controlled by supervisors. The reduced contact of Indian Ss with educational programs was further indicated by their restricted kindergarten attendance. The majority (73%) of urban middle-class Ss had attended preschool programs as compared to a small proportion (10%) of Indian Ss ($X^2=46.0$, $df=1$, $p < .005$).

TABLE 1

Means and Standard Deviations of Background Variables

for Control and Experimental Groups

GROUP	n	AGE IN MONTHS		BENDER-GESTALT ERROR SCORE		YEARS OF SCHOOLING		NO. DAYS ABSENT[1]		FAMILY SIZE[2]	
		$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s
Middle-class	30	102.1	3.6	2.8	1.7	2.67	.5	5.3	4.4	3.5	1.8
Indian control	30	101.4	3.7	4.1	2.3	1.80	.8	19.6	15.2	5.8	1.8
Indian exper A	30	103.0	3.7	3.6	2.0	2.13	.6	16.0	13.6	5.8	2.2
Indian exper B	30	102.4	3.9	4.0	1.9	1.53	.6	17.0	13.7	6.0	2.1

Note.-- [1] from September 1, 1966 to April 30, 1967

[2] total number of children

Quantitative descriptions of home backgrounds are difficult to obtain without laborious home visits which were considered beyond the scope of the present study. Some indication of home conditions is given by a crowdedness index, such as size of family, particularly when size of home and economic status are considered. The number of children in the home, shown in Table 1, indicated that Indian families were significantly larger than urban middle-class ($F=10.59$, $df=3, 116$, $p < .001$). Furthermore, the homes on reserves were reported to consist of one- or two-bedrooms compared to the near 1 : 1 ratio of persons to bedrooms in the middle-class homes.

Design

The three-study format described previously was followed in the present research. Study one examined the cultural differences in mediational behavior. Performances of Indian and middle-class control groups on the ORS and transposition tasks were compared. In addition, the comparability of these two mediational tasks was examined. In study two, the facilitating effect of an experimental verbalizing treatment was examined by comparing the performances of two experimental groups of Indian Ss with that of the Indian control group. One experimental group (Group A) was given the ORS under verbalizing conditions; the other group (Group B) was given the transposition task. Study three was concerned with relating the performance of Indian and middle-class control groups to scores on several language measures.

The two control groups, Indian and middle-class, were given the complete battery of mediational tasks and language measures. Performance of these two groups on the mediational tasks was considered in

TABLE 2

Composition of Samples for

Studies 1, 2, and 3

GROUP	n	CONSIDERED IN		
		STUDY 1	STUDY 2	STUDY 3
Urban middle-class	30	X		X
Indian control	30	X	X	X
Indian exper A (ORS)	30		X	
Indian exper B (Transposition)	30		X	

Study 1 (Table 2). Language behavior, together with mediational task performance, of the two groups provided the data for Study 3. The mediational performances of the three Indian groups, control and experimental A and B, were compared in Study 2. The experimental group Ss were given only the preliminary tests (described below) and one mediational task, ORS or transposition.

Study 1

A Cultural Comparison of Mediational Performance on ORS and Transposition Tasks

Problem

A recognized characteristic of Indian reserve children is their paucity of language experiences. It was postulated that important concomitant deficits in learning abilities result. Language does not come to serve its mediating function in covertly guiding responses and facilitating learning. The present study compared the performance of Indian and middle-class children on tasks which have been held to indicate the presence or absence of mediating responses.

To clarify any observed differences, the selected tasks minimized the role of verbal comprehension and communication. The ORS procedure of the Kendlers (1966) and a modification of the transposition procedure developed by Stevenson and Iscoe (1954) were used. For convenience, the procedures were referred to as the "mediational tasks" throughout the study.

Mediational Tasks and Procedure

The ORS task. The apparatus employed was similar to that developed by the Kendlers (Kendler, Kendler, and Learnard, 1962). Pairs

of stimuli were presented in small windows which could be covered by lowering a screen. The S indicated his choice by pushing a lever forward, receiving a candy reward from a slot below the levers if he was correct (Appendix A). A candy dispenser operated by a foot pedal was used. Stimulus cards, similar to those used by the Kendlers (1966), consisted of four squares differing in size and brightness mounted in pairs on a grey pasteboard card. Two squares were small (1 sq. in.) and two were large (3 sq. in.); two were black and two were white. The four squares were paired so that they varied simultaneously on these two dimensions. Small black appeared with large white; large black with small white (Figure 1).

The ORS procedure consisted of three stages - initial discrimination learning, optional shift, and test series. Following the instructions (Appendix B), the stimulus pairs were presented alternately in a prearranged series designed so that each pair appeared equally often but not more than twice in succession. In addition, the schedule ensured that the correct stimulus appeared equally often in the left and right windows but no more than twice in succession in any one position. Stimuli were not changed, however, until a correct response had been made.

Each of the four stimulus values (small, large, black, and white) was initially relevant for an equal number of Ss in each group. In the illustrated example (Figure 1), S was rewarded each time he pushed the lever corresponding to the large square. Initial discrimination learning was considered to have been attained once nine correct out of ten consecutive responses were given.

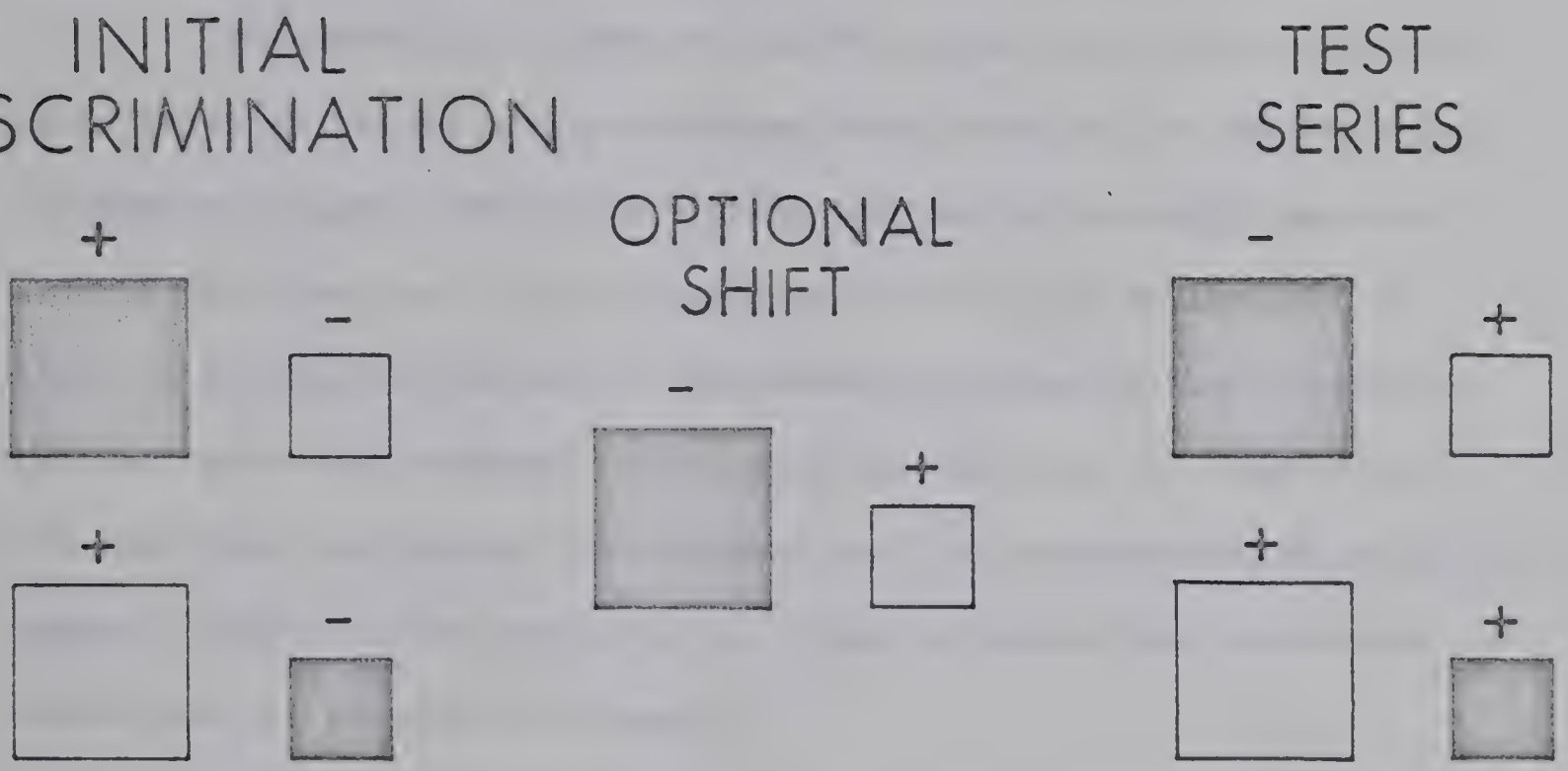

FIGURE 1

Example of ORS Stimuli and

One of the Reinforcement Patterns

The optional shift stage immediately followed. Only one of the stimulus pairs was presented and the previous reinforcement pattern was reversed. Thus, in the illustrated example, the small white square was rewarded. This shift, from large black to small white, could be learned by responding to "small" or to "white" or to both values indiscriminately. Criterion for this stage was nine correct out of ten consecutive responses.

Immediately following the shift series, both pairs of stimuli were presented in the same prearranged order used in the initial discrimination stage. The pair not presented during the shift was considered the "test pair" since responses to this pair determined the basis of S's shifted response. Responses to either of the stimuli in the test pair were rewarded. The reward pattern for the other pair followed that used during the optional shift to maintain the shifted response. Each pair was presented ten times following the prearranged sequence used in the initial stage.

At the end of the testing, S was shown the "optional shift" pair and asked to explain which square was correct. Modification in the questioning was indicated by pilot work to avoid using the word "correct" which confused Indian Ss. The question, "Which one was the good one?" was asked followed by, "What does it look like?" if no response was made.

The transposition task. Circles of differing sizes, mounted singly on stimulus cards, were presented three at a time. The S's task was to learn which of the cards covered a candy reward. For one-half the Ss (Large Group) the largest circle was correct; for the other half (Small Group) the smallest was correct. Once S had learned the correct

response, a transposition task (Task A) was given him. For the Large Group a card with an even larger circle was substituted for the smallest circle. The Ss who had learned the initial task by abstracting the relationship among circles were expected to select the circle on the new card (i.e., to make a relative response) since it was now the largest. Other Ss were expected to choose the same circle they had during initial training (i.e., to make an absolute response) which became the middle-size circle in Task A. Similarly, for the Small Group, a smaller circle than all others was substituted for the largest circle. The new card became the correct relative choice. Only the new card was baited in Task A.

When S had learned to respond to the relatively correct card (largest or smallest, depending on group) in Task A, the circle cards were replaced by three cards each of which showed an animal picture of approximately the same size (Task B). The pictures were line drawings of a mouse, a dog, and a horse (Appendix C). Task B was considered to be a more demanding test of transposition since S was required to apply the dimension of size to the pictures' referents. Large Group Ss who chose the horse picture and Small Group Ss who chose the mouse picture were considered to have made relative responses. In terms of mediational processes, these children were considered to have made the mediating response "largest" or "smallest" in the process of learning the correct circle (Jensen, 1966). Task B was of particular importance because it used stimuli and dimensions (i.e., animals differ because of size) similar to those used in curriculum material. Pilot work indicated that children in both populations were familiar with the three animals pictured.

The stimulus cards were presented on a board 14" x 3" with small divider boards to allow the placement of three 3" by 4" cards side by side. In the middle of each card position was a depression to hold the candy reward (Appendix C). Each circle and picture was made of yellow art paper affixed in the center of a grey pasteboard card. The circles increased in area by the ratio 1:2, as suggested by Spiker and Terrell (1955). Diameters of circles were (a) 1.4 cm., (b) 2 cm., (c) 3 cm., (d) 4.2 cm., and (e) 5.7 cm. The animal pictures were drawn on rectangular backgrounds measuring 5.6 cm. by 6.2 cm.

Cards (b), (c), and (d) were initially presented. A candy was inserted under card (b) for the Small Group and card (d) for the Large Group while the board was hidden from S behind a small screen. The apparatus was slid in front of S with the instructions:

> One of these pictures is the 'good one' and has a candy under it. You are to think which picture it might be and pick that picture up. If you are correct, you win the candy. If you are wrong, nothing will be there. After a while you will learn how to win a candy every time.

The apparatus was slid behind the screen after S's response so that cards and candy could be repositioned. A predetermined position sequence was followed so that each card was randomly positioned but appeared no more than twice in succession in the same position. To correct for possible position habits, cards were not moved until a correct response had been made. The three cards were presented following the original reward pattern until a criterion of five consecutively correct responses was attained.

Task A was immediately presented. Card (b) was replaced by card (e) for the Large Group; card (d) replaced by card (a) for the

Small Group. Only the new card was baited since it was the relatively correct response. After each trial, the apparatus was removed from S's view and cards rearranged following the predetermined sequence. Trials on Task A continued until five consecutively correct responses were given.

Task B, which substituted the three animal pictures for the circles, was then presented. Each of the pictures was baited and S's choices on five trials recorded. Cards were repositioned behind the screen after each trial.

At the completion of the transposition tasks, S was shown the three cards presented in Task B and asked to describe the correct one under questioning similar to that used in the ORS.

Dependent Variables

Responses were recorded throughout the ORS and transposition tasks on special forms (Appendix D and E) placed out of S's sight. The following measures were derived from the ORS task:

(a) number of trials to reach criterion on initial discrimination stage.

(b) number of Ss giving each type of response on test series. Responses were considered (i) reversal if stimulus value opposite to the initially-relevant value was selected, or (ii) nonreversal if the initially-relevant value was maintained. In the illustrated example (Figure 1), a response to the small square was a reversal since "large" was initially correct. Response to the large black square was a nonreversal since it indicated S shifted his response by leaving the size dimension to respond to "black."

(c) number of Ss giving each type of posttest verbal explanation. Responses were categorized as (i) verbalized correct dimension, (ii)

verbalized incorrect dimension, (iii) irrelevant, and (iv) no verbalization following definitions given by Kendler (Kendler et al., 1962).

The transposition procedure yielded the following measures:

(a) number of trials to reach initial criterion.

(b) number of Ss responding in a consistently relative manner on Task A. Responses to the value (smallest or largest) maintained in initial training, rather than to the same absolute circle chosen initially, were considered relative responses. An S responding relatively on each of the first five trials was classified as a consistent relative responder.

(c) number of Ss responding in a consistently relative manner on Task B.

(d) number of Ss giving each type of posttest verbal explanation. Explanations were classified as correct, incorrect, or none.

For the purposes of Study 1, number of Ss in each of the test response categories (i.e., measures number 2 and 3 in transposition and number 2 in ORS) were considered as the dependent variables. The other measures were considered in later studies.

Design and Analyses

All Ss in the urban middle-class and Indian control groups were given the transposition and ORS tasks separated by a period of at least two weeks. Order of administration was counter-balanced so that one-half of each group was given the transposition test first and the other half the ORS. The testing period started with administration of the Visual Motor Gestalt Test followed by the first mediational task. After the two-week interval, S was given the second task and language

measures. Approximate testing time for each of the two sessions was twenty-five minutes.

Comparisons between the two cultural groups were made on the basis of dependent variables from each of the ORS and transposition procedures. Sutcliffe's (1957) multiple-classification chi-square was employed using the factors of cultural group (urban middle-class and Indian), sex (male and female), and type of response (relative vs other in transposition tasks; reversal vs other in ORS task).

The comparability of the two mediational tasks was examined by considering the number of "mediators" (reversers on the ORS and relative responders on the transposition tasks). The association between number of mediators and type of task for each cultural group was tested for significance by the Sutcliffe chi-square procedure. A further test of comparability was provided by examining the transposition task behavior (relative or nonrelative) of ORS reversers and nonreversers. Significance of association between response on transposition and response on ORS was tested by chi-square.

Hypotheses

A. Fewer Indian Ss than middle-class respond mediationally in learning the ORS and transposition tasks.
   1. A significantly smaller number of Indian Ss than middle-class Ss are classified as reversers on the ORS.
   2. A significantly smaller number of Indian Ss than middle-class give consistently relative responses on each of Task A and Task B in the transposition procedure.

B. Differential responses on ORS (i.e., reversal and nonreversal)

correspond to responses on transposition tasks (i.e., relational and nonrelational).

1. The proportion of Ss within each cultural group giving reversal responses on the ORS is not significantly different from the proportion of relative responders on the transposition tasks.
2. Significantly more ORS reversers than nonreversers respond in a consistently relative manner on the transposition tasks.

Specific Results and Discussion

Cultural comparisons of number of mediators. Fewer Indian Ss than middle-class Ss were reversers on the ORS (Table 3). Less than half of the Indian children (14 of 30) reversed their manner of responding on the test series compared to about seventy percent of the middle-class agemates (21 of 30). The association between cultural group and type of ORS response was statistically significant ($X^2=3.36$, df=1, $p < .10$). The factors of sex and initially relevant dimension were not associated significantly with number of reversers. Nor were interactions among factors statistically significant indicating that, regardless of sex or concept to be learned, fewer Indians gave reversal responses. Results of ORS testing supported the hypothesized cultural differences in mediational performance.

Performance on the transposition tasks, however, did not support the hypothesized cultural differences (Table 4). Indian and middle-class groups provided approximately the same number of relative responders on each of the transposition tasks.

Transposition Task A, which required S to respond to a new

TABLE 3

Number of Ss Giving Reversal and Other Responses

on Test Series of the ORS Procedure

GROUP	INITIAL DIMENSION	n	TYPE OF RESPONSE		
			REVERSAL	NONREVERSAL	INCONSISTENT
INDIAN - MALE	SIZE	8	5	3	0
	BRIGHTNESS	7	3	3	1
- FEMALE	SIZE	7	3	3	1
	BRIGHTNESS	8	3	4	1
MIDDLE-CLASS - MALE	SIZE	8	6	2	0
	BRIGHTNESS	7	4	3	0
- FEMALE	SIZE	7	6	1	0
	BRIGHTNESS	8	5	3	0
TOTAL		60	35	22	3

TABLE 4

Number of Ss Giving Consistent Relative Responses on Transposition Tasks A and B

GROUP	CONCEPT	n	TASK A		TASK B	
			TYPE OF RESPONSE		TYPE OF RESPONSE	
			RELATIVE	OTHER	RELATIVE	OTHER
INDIAN - MALE	Large	7	4	3	3	4
	Small	8	5	3	7	1
- FEMALE	Large	8	6	2	2	6
	Small	7	7	0	6	1
MIDDLE-CLASS - MALE	Large	7	5	2	6	1
	Small	8	7	1	7	1
- FEMALE	Large	8	8	0	2	6
	Small	7	5	2	3	4
TOTAL		60	47	13	36	24

combination of different-sized circles, appeared to be too easy a task. About eighty percent of the Ss (47 of 60) responded in a consistently relative way to this task. The low difficulty level precluded the possibility of statistically significant differences between groups. Indian male Ss tended to perform in the hypothesized direction (9 relative responders in group of 15) but Indian female Ss performed as well as middle-class Ss. The hypothesis of cultural differences on Task A was thus not supported.

Indian and middle-class groups performed in the same way on Task B contrary to the hypothesized cultural differences. Sixty percent of Ss in each group (18 of 30) transposed their initial basis of selection to the animal pictures used in Task B. The factors of concept and sex were significantly associated with type of response. More males than females were relative responders ($X^2=6.94$, df=1, $p < .01$); the concept "small" was associated with greater success than the concept "large" ($X^2=4.44$, df=1, $p < .05$). The unexpected influence of sex and concept suggested that biases existed in the stimulus material. Lack of support for hypothesized cultural differences appeared to be due, in part at least, to confounding by other factors on Task B.

In summary, performance on the ORS procedure supported the hypothesized retardation of Indian children on mediational tasks. The Indian Ss' performance on the ORS was typical of Ss some two or three years younger in the Kendler studies (Kendler, Kendler, and Learnard, 1962). Performance on transposition tasks, however, was not associated with cultural differences. But there appeared to be flaws in the transposition procedure. Task A was limited by a ceiling effect not found in

earlier use of the procedure. Stevenson and Iscoe (1954) found that only 83 of 140 Ss in grades four to seven were relative responders on a similar task. These researchers considered the success level surprisingly low and commented that, " . . . additional data for Ss of this age level for three-stimulus transposition are not available by which this relatively low frequency might be explained (Stevenson and Iscoe, 1954, p. 253)." This relatively low frequency was not found in the present study. Performance on Task B appeared to be influenced by inequalities in the stimulus materials. The ORS and transposition procedures thus appeared to be less similar than expected. The relationship between procedures was considered in the second part of Study 1.

Comparability of ORS and transposition procedures. Both the ORS and transposition procedures were considered to call for mediational responses (Jensen, 1966). Reversal of initial responses on the ORS has been explained in terms of mediators interceding between stimulus and response to maintain the initially-relevant dimension (Kendler and Kendler, 1959). Similarly, consistent relative responding on the transposition tasks was attributed to covert mediators ("small" or "large") which lead to transposition of initially-learned relationships.

One test of the comparability of the tasks was provided by examining the performance of Ss in each cultural group on the tasks (hypothesis B-1). As discussed previously, more "mediators" were associated with Transposition Task A than with the other tasks (Table 5). The association between number of "mediators" and type of task, as tested by Sutcliffe's (1957) analysis, was statistically significant ($X^2_{AB}=6.53$, df=2, $p < .05$) thus rejecting the hypothesis that a similar proportion of

TABLE 5

Number of "Mediators" and "Nonmediators" on

Each Task for the Two Cultural Groups

GROUP	TYPE OF RESPONSE	TASK			TOTAL
		ORS	TRANSPO A	TRANSPO B	
INDIAN	mediational	14	22	18	54
MIDDLE-CLASS	mediational	21	25	18	64
INDIAN	nonmed.	16	8	12	36
MIDDLE-CLASS	nonmed.	9	5	12	26
TOTAL		60	60	60	180

"mediators" would be found for each of the mediational tasks. Furthermore, when the three tests (ORS, Task A, and Task B) were considered together, there was no significant association between cultural group and the dependent variable--number of "mediators" ($X^2_{AC}=2.44$, df=1, $p > .10$). That is, combining performance on the mediational tasks removed the cultural differences identified by considering the tasks separately. From this point of view, the mediational tasks were not comparable.

A second comparison of performance on the tasks was provided by examining the transposition task performance of ORS reversers and nonreversers (hypothesis B-2). As indicated in Table 6, performance on ORS was somewhat related to Task A performance. In the total group, eighty-five percent (30 of 35) reversers compared to about seventy percent of nonreversers (17 of 25) gave consistently relative responses on Transposition Task A. However, the association between performances on ORS and Task A did not reach statistical significance ($X^2=2.66$, df=1, $p > .10$). The large proportion of Ss classified as relative responders on Task A suggests that the task was too simple to permit differential performance in association with other factors, such as performance on ORS.

Performance on ORS was not strongly associated with performance on Transposition Task B for the total group of Ss. About seventy percent (24 of 35) of ORS reversers and fifty percent of nonreversers (12 of 25) gave consistently relative responses on Task B. The association between classification on ORS and classification on Task B for the total group did not reach significance ($X^2=2.63$, df=1, $p > .10$). For the Indian group, however, the association between the tasks was much stronger. About eighty percent of reversers (11 of 14) as compared to forty-five

TABLE 6

Transposition Task Performance of ORS Reversers and Nonreversers[1] for Indian, Middle-Class, and Total Groups

GROUP	ORS CLASSIFICATION	CLASSIFICATION ON			
		TRANSPO TASK A		TRANSPO TASK B	
		RELATIVE	NONREL	RELATIVE	NONREL
INDIAN	Reverser	11	3	11	3
	Nonreverser[1]	11	5	7	9
MIDDLE-CLASS	Reverser	19	2	13	8
	Nonreverser[1]	6	3	5	4
TOTAL	Reverser	30	5	24	11
	Nonreverser[1]	17	8	12	13

Note.-- [1] Nonreversal group includes Ss responding in both nonreversal and inconsistent manners.

percent of nonreversers (7 of 16), responded relatively on Task B yielding a statistically significant association ($X^2=3.77$, df=1, $p < .05$). The tendency for ORS reversers in the middle-class group to respond relatively on Task B did not near statistical significance ($X^2 < 1$, df=1, $p > .10$).

Thus, little evidence was found to support the comparability of ORS and transposition tasks suggested by a priori explanations. The ORS produced significantly different results between the cultural groups; transposition tasks showed no cultural differences. ORS "mediators" and "nonmediators" showed similar transposition performance except when the Indian group was considered separately. For the Indian group, a significant association existed between reversal performance on ORS and relative responding on Transposition Task B. None of the other comparisons, however, were supportive to the hypotheses.

The results of Study 1 partially supported the hypothesis of cultural difference in mediational performance. On the ORS, Indian Ss performed at a level equivalent to five- or six-year-olds in the Kendler studies. On the transposition tasks, Indian and middle-class groups performed in the same way. Direct comparison of ORS and transposition procedures tended to reject the hypothesized comparability of tasks. Transposition Task A appeared to be too easy for eight-year-olds and Task B restricted by biases against female Ss and Ss assigned to the Large Group.

Study 2

Effects of Verbalizing Choice on ORS and Transposition Performance with Indian Children

Problem

Differential performance on ORS and transposition tasks has been explained on the basis of presence or absence of mediational responses. Verbal mediation, in particular, has been suggested as contributing to type of response (Goss, 1961; Jensen, 1966). A relatively precise method of studying the influence of verbal mediation has been to ensure S mediates by having him overtly verbalize during the task.

Pyle's (1932) early work showed the facilitating effect that overt labelling had on discrimination learning. Reese (1966) and Kendler (1964) have introduced overt verbalizing treatments to transposition and ORS procedures, respectively. Verbalization of the type, "The big one is the winner," were provided Ss by the instructions. For the purposes of the present study these instructions appeared to be inappropriate because, in addition to encouraging S to bring words to the task (i.e., to verbally mediate), they elaborated the purpose and elements of the task. Marsh and Sherman (1966) attempted to provide equal elaboration of the task to experimental and control groups by having one group verbalize the correct dimension and the second group verbalize an incorrect dimension. Such a procedure does not, however, lead to a direct determination of the proportion of Ss who, on their own, would respond in a mediational manner.

An experimental verbalizing treatment was developed for the present study to reduce the extra instructions about the task given the experimental group while maintaining an uninstructed control group. In

Jensen's terminology, the purpose of the treatment was to lower the "arousal threshold" of verbal mediation. Essentially, experimental group Ss were encouraged to overtly use labels already existing in their repetoire. The instructions, "I want you to tell me which picture you are going to choose before you push the stick," were given each experimental S. In this way overt verbal responses interceded between stimulus and choice response in much the same role ascribed covert verbal mediation in more mature learners (Kendler and Kendler, 1959).

Experimental Procedure

Experimental group A (Table 2) was given the ORS task under the verbalizing instructions. To avoid overwhelming S with instructions, the directions to overtly label the intended choice were given after two correct responses in the initial discrimination stage had been given. If S's explanation persisted to be inadequate or inappropriate (i.e., not specifically mentioning the relevant stimulus value) he was asked, "Why are you going to pick that one?" Instructions were reduced to, "Which one?" for the remainder of the initial discrimination and optional shift stages or until S spontaneously verbalized. The remainder of the ORS procedure was the same as that given the control group.

Experimental group B was given the transposition procedure under a similar verbalizing treatment. Once two correct responses had been given S was told, "From now on I want you to tell me which picture you are going to choose before you pick it up." Further explanations were elicited by the question, "Why are you going to pick that one?" if responses were inadequate. Instructions were reduced to, "Which one?" until Test A was given or until S spontaneously verbalized. The standard

transposition procedure (as described in Study 1) was followed for the remainder of the task.

Testing for Ss in Experimental A, Experimental B, and control groups on the mediational tasks was preceded by administration of the Bender Gestalt test. The Ss were seen in random order so that temporal and order effects were spread across all three groups. The apparatus was situated in the room in such a way that each S was aware only of the equipment with which he was being tested.

Dependent Variables

Selected measures from the ORS and transposition tasks served as dependent variables in Study 2. Indications of learning speed and presence or absence of mediational response were used. Variables considered from the ORS procedure were:

(a) number of trials to reach criterion on initial discrimination stage.

(b) number of Ss giving reversal and nonreversal responses on the test series (defined in Study 1).

(c) number of Ss giving correct, incorrect, irrelevant, and no posttest explanations.

Measures from the transposition tasks considered as dependent variables in Study 2 were:

(a) number of trials to reach initial criterion.

(b) number of Ss responding in a consistently relative manner (defined in Study 1) on Task A.

(c) number of Ss responding in a consistently relative manner on Task B.

(d) number of Ss giving correct, incorrect, and no posttest explanation.

In addition, the verbal responses given by experimental group Ss during

the tasks were recorded to provide descriptions of their performance.

Design and Analyses

Members of the total group of Indian Ss (N=90) were randomly assigned to three groups - control, Experimental A, and Experimental B (Table 2). Control group Ss were given both the ORS and transposition tasks in two testing sessions separated by at least two weeks. Order of administration of the two tasks was counterbalanced within each cultural group. Experimental A Ss were given the ORS task under the verbalizing treatment; Experimental B Ss the transposition task under the treatment.

Effect of experimental treatments was examined by comparing speed of learning and number of "mediators," as indicated by the dependent variables, for control and experimental groups. Thus, the ORS performance of control group Ss was compared with performance of Experimental A Ss. The transposition performance of control group was compared to Experimental B group performance.

Comparison of speed of learning (number of trials to reach criterion) was conducted by a two-way factorial analysis of variance design using the factors of sex (male and female) and treatment (control and experimental). Since direction of difference was hypothesized, one-tailed tests were used.

Number of "mediators" (reversers on ORS and relative responders on transposition tasks) were compared by the Sutcliffe multiple classification X^2 using the factors of sex (male and female) and treatment (control and experimental). Comparisons of posttest explanations were made by the Sutcliffe procedure using the factors of sex, treatment, and type of explanation.

Hypotheses

A. The experimental verbalizing procedure facilitates performance on ORS for Indian Ss.

   1. A significant increase in speed of learning the ORS initial discrimination is associated with the verbalizing treatment.
   2. Significantly more experimental Ss than control Ss are classified as reversers on the ORS test series.
   3. The experimental treatment is associated with a significant increase in number of Ss mentioning the correct dimension in posttest explanations of their test behavior.

B. Performance on the transposition tasks by Indian Ss is facilitated by the experimental verbalizing procedure.

   1. A significant increase in speed of learning the initial discrimination is associated with the verbalizing treatment.
   2. The experimental treatment is associated with a significant increase in the number of consistently relative responders on Task A and on Task B.
   3. Significantly more experimental Ss than control Ss give correct posttest explanations of their performance on Task B.

Specific Results and Discussion

Experimental effect on ORS performance. Response to verbalization instructions was generally good; complete instructions were given only once to most Ss. The majority of experimental Ss used the appropriate adjective (e.g., "white" or "small"). Expanded explanations, such as "The white because it's little," which included mention of both dimensions were occasionally given (5 of 30 Ss in initial discrimination

stage; 3 of 30 Ss in optional shift stage). The majority of experimental Ss (21 of 30) spontaneously verbalized during the ORS test series. As anticipated, none of the control group Ss overtly verbalized during the procedure.

The hypothesized increase in speed of learning associated with verbalization (hypothesis A-1) was examined by comparing mean number of trials to criterion in the initial stage (Table 7). Experimental group Ss, both males and females, learned the initial discrimination with significantly fewer trials than were needed by control group Ss ($F=4.02$, $df=1, 56$, $p=.025$). Neither the sex nor treatment-sex interaction effects were significant. The variance of scores tended to be greater for control group Ss but the disparity did not reach statistical significance ($F_{max}=3.45$, $df=14$, $k=4$, $p > .05$). The verbalization procedure, therefore, appeared to facilitate the discrimination learning of Indian Ss given the ORS procedure.

The experimental study was primarily concerned with the association between overt verbalization and mediational-type responses of Indian Ss. The effect on ORS was studied by comparing number of reversers in the experimental and control groups (hypothesis A-2). Earlier in the present research (Study 1), Indian Ss had been shown to provide significantly fewer reversers than middle-class agemates. The verbalization treatment was expected to provide Indian Ss with overt mediators which would serve a similar function to that of the covert mediators assumed to be available to advantaged learners.

More than 85% (26 of 30) Ss in the experimental group, compared to less than 50% (14 of 30) of control group Ss, responded in a

TABLE 7

Effect of Experimental Treatment on Speed of Learning and Number of Reversers on ORS

GROUP		n	NUMBER OF TRIALS ON INITIAL DISCRIM.		NUMBER OF Ss BY ORS CHOICE BEHAVIOR	
			$\bar{X}$	S	REVERSAL	NONREVERSAL
Exper. A	male	15	14.4	6.52	13	2
	female	15	16.2	6.66	13	2
Control	male	15	24.8	12.10	8	7
	female	15	20.1	11.06	6	9
Total		60			40	20

reversal manner on the ORS (Table 7). Analysis of the full treatment-by-sex contingency table was not permitted because of the small cell size in the nonreverser column. The sex factor was removed to form a treatment (experimental and control) by choice behavior (reversal and nonreversal) table for chi-square analysis. The association between treatment and number of reversers was statistically significant ($X^2=10.8$, df=1, $p < .01$) supporting the hypothesized facilitation of mediational-type performance in the ORS. Indian children appeared to benefit from assistance in bringing words (lowering the arousal threshold of verbal mediation) to a task presumably calling for mediational responses.

Further information about the treatment effect was provided by an analysis of the verbal responses given by experimental Ss during the test series. As mentioned previously, most of the group spontaneously carried their overt verbalization to the ORS test series even though the experimental treatment did not specifically elicit verbalization beyond the optional shift stage. Considerable variations were noted among the test series verbal responses (Table 8). A fairly sizable group (7 of 30) used two adjectives, one for each pair presented them. For example, S would say "white" for pair A and choose the small white square then say "black" for pair B and choose the small black pair, suggesting that he saw each pair as a separate problem. An important finding was that all Ss who responded in a nonreversal manner gave this disjointed explanation. Rather than allowing the verbal response used during the optional shift to guide their responses to the test pair, this group chose another adjective - usually a value from the irrelevant dimension. It appeared that lowering the "arousal threshold" alone did

TABLE 8

Test-Series Verbal Responses of Experimental ORS Group

as Related to Choice Behavior

TYPE OF VERBAL RESPONSE DURING TEST SERIES	CHOICE ON TEST SERIES	
	REVERSAL	NONREVERSAL
Appropriate adjective	12	0
Adjectives for both stimulus values	2	0
Differing adjective for each pair	1	6
No verbalization	9	0
Total	24	6

not induce these Ss to perform in a mediated manner.

The experimental effect on posttest explanations of ORS choice behavior (hypothesis A-3) was investigated by comparing the number of Ss in experimental and control groups whose explanations were consistent with overt behavior. As shown in Table 9, the majority of Ss in both groups referred to the correct dimension (i.e., mentioned either one or both dimensions that had apparently guided optional shift and test series performance). Nearly all children (27 of 30 in experimental group; 25 of 30 in control group), therefore, provided explanations that were consistent with overt behavior. The small number of control group Ss falling in the other columns precluded the necessary analysis to test the hypothesized experimental effect. ORS studies which have found substantial numbers in the incorrect dimension and irrelevant categories were concerned with children much younger than Ss in the present study (Kendler, Kendler and Learnard, 1962). The present findings indicated a lack of association between type of response (reversal and nonreversal) and type of posttest explanation. Under specific questioning, most Ss were able to produce accurate verbal descriptions regardless of whether their overt test performance was of mediational-type or not. Tentative support was thus provided the earlier caution regarding the value of post-test explanations in understanding differential test behavior. The crucial role of verbalizations appeared to be their application during the test itself rather than elicitation after the test was completed.

In summary, the experimental verbalization procedure was associated with improved performance by Indian children in the ORS task. Of central importance was the significant increase in number of reversers

TABLE 9

Posttest Explanations of ORS Choice Behavior

for Experimental and Control Group Ss

GROUP	ORS TEST CHOICE	POSTTEST EXPLANATION				TOTAL
		CORRECT DIMENSION	INCORRECT DIMENSION	IRRELEVANT	NONE	
Experimental	Reversal	23	1	0	0	24
	Nonreversal	4	2	0	0	6
Control	Reversal	12	2	0	0	14
	Nonreversal	13	3	0	0	16
Total		52	8	0	0	60

consistent with the hypothesized facilitation of mediational behavior. Overt verbalization was also associated with more rapid discrimination learning at the initial stage of the ORS. Posttest explanations of the experimental group were not, however, superior to those of the control group. The majority of explanations from both groups were classified as correct. The data's support of the first two hypotheses clarifies the cultural difference in ORS performance indicated by Study 1. It would appear that Indian students overcome deficits in performance under conditions which force a verbal approach to the ORS task.

Experimental effect on transposition performance. Experimental Ss initially responded well to the instructions. Most Ss mentioned only the appropriate adjective, such as "big" or "little," during the initial discrimination stage but a sizable group (5 of 30) used a relational adjective, such as "bigger" or "smallest." Since the second stage of the procedure was a test series, Task A, verbal responses were not elicited by E. Over half the group (18 of 30) continued to overtly label their intended choice. The proportion of Ss spontaneously verbalizing during the third transposition stage, Task B, remained at about one-half (16 of 30) but only three Ss continued to use the adjective. Most of the group who spontaneously verbalized in Task B (13 of 16) used the name of the animal pictured on the Task B card.

Speed of learning the initial discrimination was indicated by number of trials to attain criterion (Table 10). It was hypothesized (hypothesis B-1) that the experimental treatment would facilitate discrimination learning. The differences between experimental and control groups in mean number of trials were not statistically significant

TABLE 10

Effect of Experimental Treatment on Speed of Learning and Number of Relative Responders on Transposition Tasks

GROUP	n	NUMBER OF TRIALS ON INITIAL DISCRIM		NUMBER OF Ss BY TYPE OF RESPONSE			
				TASK A		TASK B	
		$\bar{X}$	S	RELATIVE	OTHER	RELATIVE	OTHER
Exper. B - male	15	14.2	8.43	12	3	10	5
- female	15	17.1	7.01	11	4	7	8
Control - male	15	12.3	9.39	9	6	10	5
- female	15	18.3	12.39	13	2	8	7
Total	60			45	15	35	25

(F=.01, df=1, 56, p=.478). Furthermore, the sex effect neared significance (F=3.46, df=1, 56, p=.068) with males showing superior performance to females. The hypothesized influence of experimental treatment on speed of learning was thus rejected. The bias against female Ss was consistent with analysis of transposition performance in Study 1 but was unexpected from the rationale from which the task was developed.

The major hypothesized effect of the verbalizing treatment was facilitation of relative response on Transposition Tasks A and B (hypothesis B-2). It was expected that overt verbalization would lead to improvement in the test performance of Indian Ss. However, the hypothesized cultural deficit in transposition performance had been rejected in Study 1. Data from the present analysis led to rejection of the hypothesized experimental effect. Experimental and control groups provided equal numbers of relative responders in Task A and Task B (Table 10). In both groups, relative responses were given by about 70% of Ss in Task A and by about 60% of Ss in Task B.

Response to the verbalization treatment was further examined (Table 11) in an attempt to understand the lack of effect. It had been assumed that once Ss had been encouraged to overtly label the stimuli, they would maintain the verbal response throughout the tests. As discussed earlier, a considerable proportion of experimental Ss ceased to verbalize during the tests. Furthermore, most of those who spontaneously verbalized (13 of 16) changed their verbal response upon presentation of Task B. Quite clearly, the verbalizing treatment led to different proportions of spontaneous verbalizers in the transposition and ORS

procedures. In the ORS task (Table 8) almost one-half of the Ss (14 of 30) continued to overtly use the appropriate adjective. Task A showed a greater proportion of verbalizers (18 of 30) but no statistically significant improvement in performance over the large number of relative responders in the control group was found (Table 10).

Use of verbal responses in the transposition procedures appeared to be so tenuous that the introduction of new stimulus cards led to the choice of a different verbalization. In Task B, about half of the group (13 of 30) stated the name of the animal they were going to choose. Animal naming was particularly pronounced among those Ss choosing the mouse picture. Eight of the 13 animal-namers chose the mouse card suggesting that stimulus materials may have differentially interfered with choice patterns.

The marked tendency to discard appropriate verbal response in the transposition task appeared to be linked to an important difference between the ORS and transposition testing procedures. In the ORS procedure, Ss were required to verbalize during the first two stages, initial discrimination and optional shift. Because of the two-test nature of the transposition procedure, experimental Ss were forced to verbalize during only the initial discrimination stage. The lack of experimental effect on transposition performance may have been due, in part, to the restricted training with overt verbal responses.

Posttest explanations of experimental Ss were expected to be more accurate than those of the control group (Hypothesis B-3). Following the test series, each S was shown the Task B cards and asked to describe the winning card. About one-third of Ss in control and

TABLE 11

Type of Test-Stage Verbal Response of Experimental Transposition Group as Related to Test Choice

TYPE OF VERBAL RESPONSE DURING TEST STAGE	CHOICE BEHAVIOR ON			
	TRANSPOSITION TEST A		TRANSPOSITION TEST B	
	RELATIVE	OTHER	RELATIVE	OTHER
None	9	3	9	5
Named adjective	14	4	2	1
Named animal	-	-	6	7
Total	23	7	17	13

experimental groups mentioned the adjective that had apparently guided their overt choice (Table 12) contrary to the hypothesized superiority of experimental Ss. A large proportion of experimental Ss (19 of 30) mentioned the name of the animal portrayed despite their initial verbalization of the adjective. A small group of Ss in each group mentioned only irrelevant factors, such as card position or eating habits of the animal (e.g., "The mouse likes candy.").

Analyses of posttest explanations indicated a strong association between type of explanation and test behavior. Seventeen of 18 Ss in the two groups who mentioned the appropriate adjective were classified as relative responders (Table 12). Chi-square analysis of a reduced contingency table, test choice (relative and other) by posttest explanation (adjective, animal name, and other), showed that the association between factors was significant ($X^2=16.5$, df=2, $p < .005$).

Transposition performance was not facilitated by the experimental procedure used in the present study. The data from comparison of experimental and control group performances led to the rejection of the three hypotheses. The two-test format of the transposition procedure resulted in a reduced number of forced verbalizations which may have been related to lack of Task B improvement. In addition, the association between initially-relevant adjective and Task B stimulus material appeared to be low. The complexity of the pictorial stimulus material appeared to interfere with performance.

Study 2 provided support to the hypothesis that overt verbalization is facilitative to ORS performance of Indian Ss. The verbalization treatment had little effect on transposition performance. The

TABLE 12

Posttest Explanation of Choice Behavior on

Transposition Task B for Experimental and Control Group Ss

GROUP	TRANSPOSITION TEST CHOICE	POSTTEST EXPLANATION				TOTAL
		ADJECTIVE	ANIMAL NAME	IRRELEVANT	NONE	
Experimental	Relative	10	4	1	2	17
	Other	0	9	3	1	13
Control	Relative	7	9	2	0	18
	Other	1	10	1	0	12
Total		18	32	7	3	

differential results supported the discordant findings about ORS and transposition performance of the two cultural groups presented in Study 1.

Study 3

A Cultural Comparison of the Relationship between Language Development and Performance on Mediational Tasks

Problem

The acquisition of verbal mediation is assumed to be associated with language development. A necessary condition for the emergence of verbal mediation is considered to be facility with the communication function of language (Luria, 1957). The present study examined the assumption that Ss responding in a "mediational" manner on ORS and transposition tasks would be more advanced than "nonmediators" in overt language skills.

Facility with verbal communication appeared to be a crucial factor to consider in comparing culturally-different groups of children. The work of Deutsch (1965) has suggested that language skills reflect culturally-specific styles of thought in approaching problems. Since the problems and intended solutions presented in classrooms are couched in English, measures of English-language development were considered appropriate indices for comparing Indian and middle-class groups.

Language Measures

The need to consider several areas of language development has been emphasized by previous studies of culturally-different children (Carson and Rabin, 1960; Whiteman, 1965). Both receptive and expressive

vocabulary skills have been considered. Receptive vocabulary is assessed by S's matching pictures of objects to words spoken by the examiner; expressive vocabulary by S's definitions of the words. The present study also considered the syntactical complexity employed in S's oral descriptions.

A battery of three language measures was drawn together for the present study. Receptive vocabulary was measured by the Peabody Picture Vocabulary Test, expressive vocabulary by the vocabulary subtest of the Wechsler Intelligence Scale for Children (WISC), and complexity of syntax by Loban's (1963) index of length of communication unit.

The Peabody Picture Vocabulary Test (PPVT). The PPVT (Dunn, 1965) consists of a series of illustrated plates, each with four pictures. The examiner says the stimulus word and shows S one of the plates. Response is provided by pointing to one of the pictures or by saying the number under the picture. Although a mental age and IQ rating can be derived from the score, the PPVT was used more conservatively in the present study as an indication of receptive vocabulary.

Reliability coefficient for the age range in the present study is given as r=.79, calculated from performance of 100 Ss on parallel forms of the test. No available indications of test reliability appear to be available for Indian samples. The test shows moderate correlations of .70 to .85 with individual intelligence tests such as the Stanford-Binet and WISC (Dunn, 1965).

Because of its minimization of verbal expression, the PPVT has been effectively given to most groups of children including those with reading disabilities and speech impairment. Studies of the

culturally-disadvantaged in the U.S. have used the PPVT as a criterion of language learning (Di Lorenzo, 1967). The test is untimed and relatively short in duration (8 to 12 minutes in the present study). It is designed for children from age three years with special applicability to elementary-school aged children.

Standard instructions (Dunn, 1965) were followed in the present study except that the number of examples given was reduced from three to one unless difficulty was encountered. The reduction was permitted because PPVT testing followed several other tasks in which S had shown he could follow instructions. Pilot work indicated that the recommended starting point in the test for this age group was inappropriate for Indian Ss. Test administration for this group started with plate 20. Standard procedures for establishing basal and ceiling points were followed. The raw score was computed by subtracting the number of items incorrect from the ceiling-item number.

The WISC vocabulary subtest. The vocabulary subtest consists of forty words presented in increasing order of difficulty. The words are presented orally with S being instructed to tell what each means. Further questioning is permitted only when the response cannot clearly be categorized as correct or incorrect. Responses are recorded verbatim for later scoring.

The standard instructions and test administration provided in the WISC test manual (Wechsler, 1949) were followed with one exception. Testing usually begins with the tenth word provided that full-point responses are given to the initial five words. If this criterion is not met, earlier words on the list are given so that the starting points for

Ss may vary considerably. To provide comparable data for Indian and middle-class Ss in the present study, administration for all Ss began with the first word. The standard ceiling, five consecutive 0-point responses, was used.

The importance of the WISC Vocabulary subtest is suggested by its inclusion in most shortened forms of the WISC (e.g., Magary, 1967). Massey (1965) considers it the "best test of verbal intelligence and/or learning ability." The subtest has been used in most extended studies of language ability associated with cultural disadvantagement (e.g., John, 1963). The subtest's reliability is reported as r=.77 at age 7½ years and r=.91 at age 10½ years, as indicated by split-half correlational procedures (Wechsler, 1949).

The WISC vocabulary test was utilized in the present study as an index of expressive vocabulary since S must provide oral explanations. Standard scoring of responses yields a quantitative score which indicates essentially the number of words adequately defined by S. A second method of scoring has been developed by Rabin (Carson and Rabin, 1960) to indicate qualitative differences in word definitions. Since the abstractive function of language has been found to be sensitive to environmental variation (John, 1963), the qualitative measure was used in addition to the standard system.

The quantitative score was derived from the standards provided in the WISC manual (Wechsler, 1949) and in a recent monograph (Massey, 1965) which makes explicit some of the formerly ambiguous scoring examples. By this method, responses to the first five words are given scores of 2 or 0. Responses to the following words are scored 2, 1, or 0

depending on adequacy of definition. Generally, one point is given to a response that provides a partial or vague definition. Raw score is the sum of scores for all the words presented.

The second method of scoring, qualitative, following the Qualitative Vocabulary Scale (Carson and Rabin, 1960) which was developed for another vocabulary test but considered appropriate for WISC usage following pilot work. The qualitative scale provides seven categories ranging from definitive and abstract to vague or erroneous (Appendix F). Interscorer agreement was reported to be 79% with complete agreement being reached after discussion of debatable responses (Carson and Rabin, 1960). Interscorer agreement in the present study was found to be 82% based on two independent scorings of one hundred randomly-selected definitions.

Length of communication unit (complexity index). The length of communication unit has been suggested by Loban (1963) as an index of syntactical complexity. Oral responses are recorded for analysis into "communication units," defined as "that group of words which cannot be further divided without the loss of their essential semantic meaning (Loban, 1963 p.6)." The average number of words in each unit has been used in language surveys to indicate the complexity of sentence structure. The Complexity Index for each S in the present study was the mean number of words per communication unit.

The specific procedure involves transcription of oral responses for analysis into phonological units, indicated by a pause or change in intonation. The phonological units are then further divided into independent predications or communication units. For example, the sentence, "The kangaroo is jumping and the little kangaroo's driving his bicycle,"

would be divided after the word "jumping" to form two communication units. Abbreviated words such as "he's" are considered as two words. The length of communication units in the example are thus four and eight, respectively.

Material for the present study was selected to meet the criteria of (a) good interest level, (b) success in producing descriptions in preliminary trials, (c) special appeal to the imagination, and (d) portability. Pilot work with Indian and middle-class children suggested that pictorial material from projective tests, magazines, and comic books was suitable. Four pictures from the Children's Apperception Test (Bellak, 1954) showing animals in human situations were selected (numbers 2, 3, 5 and 8). A colored magazine illustration showing children in a classroom was also used (Appendix G). Sequences of pictures from comic strips were found to be particularly effective in creating interest. A six picture sequence was selected (Appendix H). The magazine illustration and comic strip were mounted on white cardboard backing for presentation.

Procedure

The language measures were administered to Ss in middle-class and Indian control groups in the second testing period, following the mediational task. The sequence attempted to ensure the establishment of some familiarity on the part of S to reduce serious inhibition of verbal responses.

Each S was conducted from the table holding the mediational task to a second table which held the picture material for language testing. Since responses were tape-recorded, it was necessary to place a

microphone close to the testing table. A "talking box" containing a microphone was devised for this purpose. A cut-out comic figure was affixed to the front of a small cardboard box which held the microphone. The box was placed at the back of the table and introduced as "Mr. Peanut" who could listen to what was being said. The "talking box" proved to be of passing interest, and no apparent apprehension, to Ss while ensuring clear recording of even the quietest voices. After this introduction, S was told that he and the examiner were going to play some word games.

The language measures were given in order of increasing verbal expression. The PPVT was presented first with S being asked to say the number under the chosen picture, rather than pointing, to accustom him to speaking aloud. All Ss had been found to be capable of recognizing the symbols one to four. The WISC vocabulary test was then given. Although full responses were being tape-recorded, the examiner made brief notes to provide a standard testing situation. Finally the pictures for the Complexity Index were presented in the order of Children's Apperception Test cards, classroom illustration, and comic strip. Tape-recorded responses to the language measures were later transcribed for scoring and analyses.

Dependent Variables

Scores from the language measures and the mediational tasks served as dependent variables in Study 3. Variables drawn from the language measures were:

(a) PPVT score--number of words correct

(b) WISC quantitative score--sum of credits (0 to 2) given each definition following standard scoring procedure

(c) WISC qualitative score--number of responses in each of the seven qualitative categories

(d) Complexity Index--mean number of words per communication unit.

Variables drawn from the mediational tasks were:

(a) number of Ss classified as giving consistently relative responses on Transposition Task A

(b) number of Ss giving consistently relative responses on Transposition Task B

(c) number of Ss classified as ORS reversers.

Design and Analyses

The central purpose of Study 3 was to compare the linguistic skill level of "mediational" and "nonmediational" groups. Point-biserial correlations between classification on each of the mediational tasks and scores on the language measures were computed for the total group. Furthermore, mean language scores of ORS reversers and nonreversers were compared by t-tests. Similarly, language scores of response groups (relative and others) in the transposition task were compared by t-tests.

Preliminary comparisons of the linguistic performance of Indian and middle-class groups were made. The WISC qualitative scores of the two cultural groups were compared by the median test. Performance on the other language measures was compared by two-way analysis of variance using the factors of cultural group (Indian and middle-class) and sex (male and female). Typically studies of language development have used the sex factor. Recent evidence (Ervin-Tripp, 1966) suggests that differences in performance on vocabulary and syntax measures attributable to sex are slight. The sex factor was therefore included only in preliminary analysis.

Hypothesis

A. Indian Ss show retarded language development compared to age-mates from advantaged backgrounds.

   1. The average scores for Indian Ss on vocabulary and syntax measures are significantly lower than the average scores for middle-class Ss.

   2. Indian Ss provide proportionately fewer definitions of a high qualitative level (as determined by WISC qualitative score) than do middle-class Ss.

B. Linguistic performance of Ss responding in a manner presumed to be mediational is superior to performance of other Ss.

   1. Significant correlations exist between scores on language measures and classification on mediational tasks.

   2. The average language scores of ORS reversers are significantly greater than the average scores of ORS nonreversers.

   3. The average language scores of Ss classified as relative responders on the transposition task are significantly greater than the average scores of nonrelative responders.

Specific Results and Discussion

Response to language measures on the part of Ss from both cultural groups was generally satisfactory. Indian Ss showed some reluctance to define words on the WISC vocabulary test but responded to extended encouragement. Other measures met with little resistance. Concern about the box containing the microphone was generally brief and minor. Quality of recording was good, permitting clear transcription and scoring.

Intercorrelations among the language measures, shown in Table 13, showed a differing pattern for Indian and middle-class groups. All measures showed significant intercorrelations for the Indian group. In the middle-class group, performance on the complexity index was independent of vocabulary scores.

Middle-class Ss surpassed Indian Ss on all language measures (Tables 14 and 15). Vocabulary skills, both receptive (PPVT) and expressive (WISC vocabulary), of the Indian group were considerably below averages for the age-group given by test norms. Compared to test norms (Dunn, 1965; Wechsler, 1949), Indian children had average vocabulary skills equivalent to a "mental age" of 5½ to 6 years. Average raw scores of the middle-class group were equivalent to a "mental age" of about 10 years. Syntactical complexity, as indicated by length of communication unit, was similarly retarded in the Indian group. As indicated by Loban's (1963) norms, the Indian group's performance was equivalent to midway between the kindergarten and grade one levels. Differences between cultural groups on each of the language measures were statistically significant; the sex and sex X cultural group interaction effects were not significant (Table 15). Support was thereby given to the hypothesized disadvantage of Indian Ss on vocabulary and syntactical complexity abilities (Hypothesis A-1).

Performance on the WISC vocabulary test was further studied by comparing the proportions of definitions at each qualitative level (Appendix F) for Indian and middle-class groups (Hypothesis A-2). The median proportions in Indian and middle-class groups were tabulated (Table 16) for comparison by the median test for two samples (Dixon and Massey,

TABLE 13

Intercorrelations Among Language Measures

for Indian and Middle-Class Groups

MEASURE	GROUP	n	CORRELATION WITH[1]			
			COMPLEXITY	WISC-QUANT.	WISC-QUAL.	PPVT
PPVT	Indian	30	362*	723**	718**	1000
	Middle-class	30	066	608**	587**	1000
WISC-QUAL.[2]	Indian	30	569**	932**	1000	
	Middle-class	30	187	911**	1000	
WISC-QUANT.	Indian	30	418*	1000		
	Middle-class	30	287	1000		
COMPLEXITY	Indian	30	1000			
	Middle-class	30	1000			

Note.- [1] decimals have been omitted

[2] number of definitions classified as

* significantly greater than 0 at $\alpha < .05$

** significantly greater than 0 at $\alpha < .01$

TABLE 14

Means and Standard Deviations on Language Measures

For Indian and Middle-Class Groups

CULTURAL GROUP	SEX	n	LANGUAGE MEASURE					
			PPVT		WISC - QUANT.		COMPLEXITY	
			$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s
Indian	male	15	52.40	6.29	16.07	5.24	6.05	0.92
	female	15	52.07	7.03	13.40	4.85	5.39	1.92
Middle-class	male	15	76.73	9.62	31.07	4.86	8.32	1.42
	female	15	77.13	8.52	30.13	5.57	8.57	1.19

TABLE 15

Analyses of Variance on Average

Language Scores

LANGUAGE MEASURE	SOURCE	F	df	P
PPVT	sex	0.00	1	.987
	cultural group	144.15	1	.000
	sex X cult. group	0.03	1	.859
WISC-QUANT.	sex	1.84	1	.180
	cultural group	142.96	1	.000
	sex X cult. group	.43	1	.516
COMPLEXITY	sex	0.32	1	.573
	cultural group	56.03	1	.000
	sex X cult. group	1.55	1	.218

1959, pp. 295-296). It was evident that middle-class Ss tended to give more high quality definitions. On the average, some eight percent of the definitions of this group were classified as "categorizations and synonyms"; eleven percent of the middle-class definitions were classified as "essential descriptions." By comparison, the average proportion of Indian Ss' definitions falling in these top two categories were four percent and zero percent, respectively (Table 16). No significant cultural difference in the proportion of definitions classified as "essential functions" was found. Significantly more of the Indian Ss' definitions than those of middle-class Ss fell in the "don't know" category (40% and 19%, respectively). The cultural groups tended therefore to give similar proportions of definitions falling in the middle qualitative categories but showed marked variation in the upper and lower categories in the hypothesized directions.

Thus, Indian Ss showed both retarded linguistic skills (Study 3) and less tendency to respond reversally on the ORS (Study 1). The second part of Study 3 was concerned with directly comparing the relationship between language development and performance on the mediational tasks.

The correlations between classification on mediational tasks and scores on PPVT, WISC Vocabulary, and Complexity Index were computed (Table 17). Mediational task performance was coded as either 1 for "mediators" (ORS reversers and transposition relative responders) or 0 for "nonmediators" for each of the tasks. It was hypothesized that significant point-biserial correlations would exist between the classification and language scores (Hypothesis B-1). As indicated in Table 17, all

TABLE 16

Median Proportion of WISC Vocabulary Responses
In Each Qualitative Category for Indian and
Middle-Class Groups

CATEGORY	MEDIAN PROPORTION FOR		X^2 FOR MEDIAN TEST	P
	INDIAN	MIDDLE-CLASS		
Categorization/synonym	.04	.08	5.17	.025
Essential description	.00	.11	6.67	.01
Essential function	.25	.27	< 1	NS
Example	.00	.04	4.27	.05
Vague description/function	.18	.19	< 1	NS
Error	.00	.07	2.40	NS
Don't know	.40	.19	38.40	.005

TABLE 17

Point-Biserial Correlations Between Classification on Mediational Task[1] and Language Performance for Total Group (N=60)

LANGUAGE MEASURE	CORRELATION[2] WITH CLASSIFICATION ON		
	ORS	TRANSPO. TASK A	TRANSPO. TASK B
PPVT	315*	155	-012
WISC-QUANT.	359**	097	-014
COMPLEXITY	289*	086	023

Note.- [1] classification as mediator was coded as 1, nonmediator as 0.

[2] decimals have been omitted.

correlation coefficients were small. The correlation between ORS classification and scores on each of the language measures was, however, statistically significant (r=.289 to r=.359, N=60). None of the correlations between classification on either Transposition Task A or Task B and language performance were significantly greater than zero. Statistical significance was tested by the t-statistic (Ferguson, 1959, p. 203). The hypothesized relationship was therefore supported by ORS data but not by transposition data.

Partial support was provided for the hypothesized superiority in linguistic skills of ORS reversers over nonreversers (Hypothesis B-2). Reversers in the middle-class group tended to show greater vocabulary scores than nonreversers (Table 18). The difference between vocabulary scores of reversers and nonreversers was significant for the WISC vocabulary test (p=.029, one-tailed) and neared statistical significance for the PPVT (p=.076, one-tailed). However, vocabulary scores for reversers and nonreversers in the Indian group showed no significant differences. Furthermore, reversers and nonreversers in each cultural groups showed similar Complexity Index scores.

Language performance of Ss classified as relative responders in Transposition Task B was essentially the same as performance of the other group (Table 19). The hypothesized superiority of the "mediating" group was therefore rejected (Hypothesis B-3). The difference between groups did not near significance on any of the language measures.

In summary, the hypothesized relationship between linguistic ability and mediational task performance was supported in part by ORS data but rejected by transposition data. Advanced vocabulary development

TABLE 18

Comparisons of Language Scores on Basis of ORS Performance

LANGUAGE MEASURE	CULTURAL GROUP	n	LANGUAGE SCORES				COMPARISON OF MEANS		
			REVERSER		NONREVERSER				
			$\bar{X}$	s	$\bar{X}$	s	t	df	P
PPVT	Indian	30	52.36	5.92	52.13	6.86	0.10	29	.462
	Middle-class	30	78.48	7.76	73.33	9.89	1.48	29	.076
WISC-QUANT.	Indian	30	15.29	5.38	14.25	4.71	0.54	29	.296
	Middle-class	30	31.76	5.25	27.89	3.31	1.98	29	.029
COMPLEXITY	Indian	30	6.08	1.67	5.40	1.14	1.23	29	.114
	Middle-class	30	8.50	1.05	8.32	1.67	0.33	29	.372

TABLE 19

Comparisons of Language Scores on Basis

of Transposition Task B Performance

LANGUAGE MEASURE	CULTURAL GROUP	n	LANGUAGE SCORES				COMPARISON OF MEANS		
			REL. RESPONSE		OTHER				
			$\bar{X}$	s	$\bar{X}$	s	t	df	P
PPVT	Indian	30	53.11	6.67	50.92	5.85	0.89	29	.189
	Middle-class	30	75.78	7.88	78.67	9.72	0.86	29	.195
WISC-QUANT.	Indian	30	15.22	5.15	14.00	4.88	0.63	29	.267
	Middle-class	30	29.89	4.61	31.67	5.53	0.92	29	.164
COMPLEXITY	Indian	30	5.98	1.48	5.32	1.42	1.19	29	.122
	Middle-class	30	8.25	1.34	8.73	1.10	1.00	29	.125

was associated with ORS reversal responding but not to transposition test behavior. Scores on the Complexity Index were not related to performance on either the ORS or transposition tasks.

CHAPTER IV

A DISCUSSION AND INTEGRATION

The present research compared the mediational-task performance of Indian children with the performance of children from advantaged backgrounds. Differences in experiential background, particularly in the areas of verbal stimulation and verbal approaches to problems, were hypothesized to be associated with retarded development of mediational responses in the Indian group.

Marked differences in background experiences of the two cultural groups, reservation Indian and urban middle-class, were apparent. Despite similar chronological ages in the two groups, middle-class Ss had been in school a year longer on the average than Indian Ss. In addition, most of the middle-class group had attended preschool programs while few Indian Ss had received this experience. Indian children were generally from larger families which, coupled with smaller homes, suggested a degree of home crowding not present in middle-class homes.

Indian Ss showed significantly poorer language performance on the vocabulary measures and index of syntactical complexity employed. English vocabulary level of the Indian group was about three years below the average for the age group reported in test manuals. Both receptive and expressive vocabulary skills showed this retardation. Use of syntax by Indian Ss appeared to be similarly below average. The postulated paucity of "verbal elements" in the Indian group was supported by all language data. The study's major task was to investigate the relationship of these language deficits to performance on tasks selected to indicate

verbal mediational responses.

Cultural comparisons of performance on mediational tasks provided partial support to the hypothesized Indian deficit. Significantly fewer Indians than middle-class Ss responded reversally on the ORS task. Reversal response has been considered to call for mediating responses. However, performances on the transposition tasks were similar for Indian and middle-class groups. The number of relative responders, which was assumed to indicate presence of mediational responders, which was assumed to indicate presence of mediational responses, was associated with both sex and initial concept. Neither of these biases were found for the ORS procedure.

The cultural difference in mediational task performance, supported in part in Study 1, was attributed to deficiencies in verbal mediation. Performance of Indian Ss was studied further by "forcing" verbalization during the task. Experimental groups of Indian Ss were encouraged to overtly describe their intended choices, thereby lowering the "arousal threshold" of verbal involvement in the tasks and providing an overt mediation response. ORS performance was significantly facilitated by the verbalizing treatment. The number of experimental-group reversers was significantly greater than the number in the Indian control group. Indian Ss appeared to benefit from specific assistance to bring verbal elements to the ORS task. Transposition task performance was not, however, affected by the experimental treatment. The number of relative responders in experimental and control groups was essentially the same. While the lack of effect on Transposition Task A could be due to the low difficulty level, with a resulting small room for improvement,

no ceiling effect existed for Task B.

Examination of verbal responses used by Ss during the experimental procedure suggested differences in effectiveness of the procedure for ORS and transposition tasks. Verbal responses used by Ss during the ORS test series were relevant and appropriate to the task; responses used during transposition tasks were characterized by inconsistency. Appropriate verbal responses elicited during initial stages were changed when S was given the transposition test material. The difficulty may have been due to the training procedure employed in the transposition procedure which was inadvertently shorter than ORS training. Experimental Ss given the transposition task appeared to first decide on the stimulus card they were going to select then, secondly, provide a verbal explanation. For overt verbalization to serve as a mediator, the reverse sequence would have to occur so that choice response would be guided by verbalization. The possibility that the task was not a valid indicator of verbal mediation also exists (see below).

Task B stimulus material appeared to contribute to the inconsistency in verbal responses. Stimulus material was pictorial rather than the outline form used in initial stages creating the possibility of associations other than size predominating. Some support was provided this possibility by posttest explanations which mentioned such irrelevancies as the mouse's hunger for candies. The bias against female Ss could be explained in terms of hierarchies of associations to stimulus material. It would not be hard to imagine that male Ss had more direct experience with the animals pictured so that associations between animals (e.g., mouse and horse) and size more likely.

Significant effects of the verbalizing treatment on one of the mediational tasks (ORS) supported the hypothesized role of verbal mediation. Further study of mediational task performance and linguistic development was conducted. Measures of syntax and vocabulary were administered to Ss in middle-class and Indian control groups. A small but statistically significant correlation existed between language performance and ORS classification; ORS reversers tended to show advanced linguistic development. Language scores were not related, however, to classification on the transposition task.

The assumed relationship between performance on mediational task and language scores was that ". . . language may develop without a corresponding development of verbal mediation processes. The reverse, however, seems never to occur (Jensen, 1966, p. 101)." Mediators would therefore be expected to show advanced linguistic development. Analyses of mean language scores of ORS reversers and nonreversers in each cultural group provided partial support to the hypothesized linguistic superiority of reversers. Vocabulary scores of reversers were greater than scores of nonreversers in the middle-class group. Complexity Index scores, however, were not significantly different, nor was language performance of reversers and nonreversers in the Indian group. Thus, the Indian data was not consistent with the hypothesized relationship.

Negative results for Indian Ss may have been related to the English-language nature of vocabulary and complexity measures. Linguistic development of Indian reversers in their native language could be more advanced. Superiority would be evidenced, therefore, in measures of Cree but not in the tests given in the present study. However,

English language cannot be completely disregarded as an influence on ORS performance of Indian Ss. In Study 2, the overt verbalization associated with significant improvement was English. It would appear that under specific instruction, use of English can facilitate performance. Variations in ability to use English in a general sense is apparently unrelated to ORS performance of Indian Ss.

Throughout the study, the ORS and transposition measures yielded varying results. Generally, hypotheses regarding ORS were confirmed; those involving transposition tasks were rejected. Comparisons of task adequacies essentially concerned their validity as indicators of verbal mediation. Three alternative conclusions appear to be possible: ORS may not indicate mediational behavior; transposition tasks may not indicate mediation; or both types of tasks may be invalid measures.

Reversal and nonreversal shifts have recevied close study by recent research. Under particular scrutiny has been the Kendler explanation that ease of reversal shift indicates presence of verbal mediating responses. While most studies have served to confirm that efficient reversal learning requires S to respond to the relevant dimension (i.e., to covertly mediate), the nature of the mediational response has been debated (Trabasso, Deutsch, and Gelman, 1966). A position contrary to that of the Kendlers has been taken by House and Zeaman (1962), Wolff (1967), and others who explain reversal-shift data in terms of attentional responses. Wolff attempted to discount the role of verbal mediation in ORS by comparing the performance of reversers and nonreversers on an Osler-type concept utilization task. Performance on ORS

was largely unrelated to performance on the second task which presumably called for mediation. It would appear difficult to justify Wolff's conclusion that the ORS does not call for verbal mediation and therefore must measure attentional responses. The arbitrary selection of any task--Osler-type, transposition, or other--does not permit specific testing of the types of behavior affecting performance. No sufficient evidence is available to consider Osler-type tasks as measures of verbal mediation.

The role of attentional responses in reversal-shift performance has been acknowledged (Kendler, 1964). Silverman's (1966) recent study concludes:

> In the Kendler's most recent papers they stress that mediating response formulation does not preclude the possibility that the effectiveness of verbalization derives from the activation of perceptual responses. Kendler, for his part, finds fault with his critics for their exclusive emphasis on observing responses to explain reversal-shift data (p. 7).

Thus, the possibility is raised that cultural differences in ORS performance and effectiveness of verbalization treatment did not reflect differences in verbal mediation.

The design of the present research permitted an examination of the degree to which verbal factors accounted for ORS performance. Significantly poorer linguistic development and fewer reversers were found in the Indian group. ORS performance of Indian Ss was significantly facilitated by an overt verbalizing treatment. The attention factor of verbalization was not supported by results from the transposition procedure in which attention would probably play an important role. Furthermore, ORS test choice tended to be related to linguistic development of middle-class Ss. Reversers were found to have advanced vocabulary skills

consistent with expectations that verbal mediators have better developed linguistic abilities. Adequate reliability of ORS procedure was suggested by similarities between proportion of middle-class reversers in the present study and proportions reported in other studies for Ss of comparable age (Kendler, Kendler, and Learnard, 1962). Throughout the present research, evidence supported the hypothesized role of verbal mediation in ORS performance.

Transposition task performance was assumed to be indicative of verbal mediation (Jensen, 1966) but recurring negative findings in the present research suggested that complications interfered with task performance. The number of stimulus cards in the transposition task employed was increased from the usual two to three in order that difficulty level for the age-range studied would be more appropriate. Most of the two-stimulus tasks were designed for preschool children or infrahumans. The stimulus materials for the second transposition task, Task B, consisted of animal pictures for which no comparative data appears to have been published (Jensen, 1966).

Transposition Task A used test stimuli which were similar to training stimuli. Two of the training stimuli and one new stimulus ("large" or "small" depending on group) were presented in Task A. Kuenne (1946) used the term "near task" to describe such a test. In contrast, a "far task" used stimuli which differed on the same dimension as training stimuli but were some distance from original stimuli. Older children made significantly more relative choices than younger children on the "far task" but no age differences existed on the "near task" (Kuenne, 1946). Alberts and Ehrenfreund (1951) found similar results and suggested

that only the "far task" discriminated between mediators and nonmediators.

Transposition behavior on the "near test," or Task A in the present study, could be due either to mediational response or to "generalization of the stimulus-response association" in the manner postulated by Spence (1942). Spence's explanation was formulated to explain transposition in infrahumans and was extended to preverbal children by Kuenne (1946). Discrimination learning is viewed as a cumulative process of strengthening the excitatory tendency of the positive cue and at the same time decreasing (inhibiting) the response to the negative cues. Response to a cue is dependent on the difference between positive excitatory and negative inhibitory strengths. Thus, in original training the positive cue has sufficient "effective excitatory strength" to elicit a response. The excitatory and inhibitory tendencies are assumed to generalize to neighboring stimulus values (Spence, 1942). In the "near task," the differences between "effective excitatory strengths" of stimuli produce a relative response. Transposition would thus occur because of generalization of cue strengths established in initial training.

Thus, predictions of Jensen (1966) and Steven and Iscoe (1954) that only mediators show relative responses on "near tasks" contradict explanations provided from two-stimulus studies. The former researchers were, of course, dealing with three-stimulus tasks which apparently led them to consider their procedure to be analogous to the intermediate-size transposition procedure which also uses three stimuli. Experimentation with intermediate-size transposition has shown that animals and infrahumans do not respond relatively on a "near task" when initial training has been to the middle-sized member (Spence, 1942; Spiker

and Terrell, 1955). These subjects consistently chose the initially-reinforced (absolute) stimulus. Spence (1942) explained that inhibitory tendencies to both larger and smaller stimuli increase so that the effective excitatory strength of the absolute stimulus remains the greatest even in the near task. Thus, S would continue to choose the initially-reinforced stimulus rather than making a relative response.

The maintenance of absolute responses by nonmediators would appear to apply only to the intermediate-size problem. Three-stimulus tasks which reinforce an extreme stimulus value (smallest or largest) appear to produce generalization curves similar to those postulated for the two-stimulus task. Negative inhibitory strengths established by initial non-reinforcement would be toward stimuli on the "non-correct" side of the dimension. For example, in the "large group" in the present study responses to the two smaller circles would be nonreinforced leading to an increase in inhibitory strength. In Transposition Task A, which substituted a larger circle for the smallest one, the new stimulus cue would have the least inhibitory strength (according to Spence's generalization curves) and the greatest effective excitatory strength. Thus, response would be to the largest circle just as in the "near task" in the two-stimulus procedure. Spence (1942) provided some support to this explanation in his discussion of Lashley's three-stimulus experiment which found that rats learned to choose the largest or smallest of three circles much more easily than the intermediate-size.

By extending Spence's concept of generalization of excitation and inhibition, one would predict that even nonmediators respond relatively to Task A since it is analogous to the "near task." From this

point of view, Task A performance would not discriminate between mediators and nonmediators. The large proportion of relative responders in the present study supports the resultant expectation that both mediators and nonmediators would transpose their responses. Discrimination between mediators and nonmediators would apparently be provided only by a "far task."

Transposition Task B was not, unfortunately, analogous to a "far task" which would vary only distance between training and test stimuli. Circular forms used in training were replaced by pictures of animals in Task B. The apparent biases against female Ss and Ss in the "large" group suggests that Task B stimuli were not consistently associated to the dimension of size. The lack of verbalizing effect found in Study 2 suggested that language served no directing function in Task B performance. However, the association between transposition performance and posttest explanations contradicts total discounting of verbal influence. Sources of variance in Task B performance, such as distance from training stimuli and complexity of materials, appear to negate its use in the present study as a relatively clear test of mediation. Further investigations of the task would have to be conducted to control effects on performance. In evaluating the transposition procedure, Hebert and Krantz (1965) wrote:

> Unfortunately, little systematic, parametric research has been performed. In addition, many studies, concerned with the same variable, have employed dissimilar experimental arrangements making the findings difficult to compare (p. 255).

The transposition procedure remains a potentially valuable method of exploring mediating responses as proposed in the present study but requires

systematic development. Little evidence was found in the present research to support the hypothesized role of verbal mediation in this form of transposition procedure.

In short, ORS performance was consistent with assumed relationships with verbal behavior; transposition task performance was not. The smaller number of ORS reversers in the Indian group would appear to be associated with retarded development of mediational responses in that group. Transposition procedures appear to require further development and control before assurance can be placed in explanations of differential performance.

CHAPTER V

SUMMARY AND CONCLUSION

The central premise of the present research was that, because of verbally-limited environmental experiences, Indian students show retarded development in acquiring the mediating functions of language. Data indicated that linguistic performance of Indian eight-year-olds was significantly poorer than that of middle-class agemates. On one of two tasks purportedly calling for verbal mediation, Indian Ss showed a significant deficit which was overcome by eliciting verbal description prior to choice. On the second task, neither cultural nor experimental effects were found. Evidence was considered which indicated that the second task, a modification of the transposition procedure, was not a valid indicator of verbal mediation.

The association between linguistic development, as indicated by scores on selected language measures, and mediational task performance was not as clear as had been hypothesized. Small but significant correlations between ORS classification and language scores were found. Performance on transposition tasks was not related to language scores.

Interpretations of results are restricted by sample and task selection. The age range was from the mid-point of the range considered to mark acquisition of verbal mediation under normal conditions. The magnitude of deficiencies would differ at other age levels. Indian Ss were drawn from reserves deemed by Indian Affairs personnel to be at the median level of acculteration and economic position. Generalization of results to other Indian groups would probably be restricted to those

of similar home language patterns, school experiences, and related factors. Limitations of mediation tasks selected were discussed previously. Language scores came from individual oral tests which followed relatively standardized procedures, but not all aspects of language development were included.

Linguistic data from the present research imply that school programs offered Indian students require modification. Indian Ss showed an average linguistic age equivalent to that of preschool children in the general population. The school program in which they were placed, the standard Alberta curriculum, apparently presupposes normal English language development. If this program continues to be followed, the need for a comprehensive readiness program would appear to be paramount. One alternative would be major modifications of at least the primary school program to accommodate weaknesses, as well as unique strengths, arising from environmental experiences.

Results also imply that the Indian student is handicapped even in problems not calling for overt verbal comprehension or expression because of slower development of mediational responses. The deficiency would appear to be related to unfamiliarity with verbal coping (i.e., a high arousal threshold of mediational responses) in addition to paucity of verbal elements.

Mediational-type performance among Indian Ss does not appear to be associated with advanced linguistic development as measured in this study. Within the Indian group, little relationship between facility with English and mediational responding was found. There was, however, a marked effect associated with the verbalizing treatment.

Assistance in other discrimination and concept-utilization tasks would possibly result from specific prompting of the Indian student to apply words to the problem. The relatively high threshold of verbal involvement may lie behind the lack of association between performance on ORS and language measures. The important linguistic ability for the mediational tasks employed may be ease of verbal involvement rather than vocabulary and syntactical development.

Study of mediational responses of culturally-different children, such as Indian students, requires extended research beyond the relatively preliminary questions pursued here. A logical extension would be an examination of performances across the age range three to twelve years to provide developmental comparisons. One particular goal would be the investigation of the "cumulative deficit" (Deutsch, 1963) shown in culturally-deprived urban children. The gap between the functioning levels of deprived and advantaged children has been found to widen as children move through grades one to five.

Further development of the transposition procedure was also indicated by the present research. Incorporation of pictorial stimuli remains an interesting alternative particularly since much of school work depends on providing information and problems by this medium. An initial step would be the study of the hierarchy of associations in pictorial material between the cultures. Investigation of other variables such as amount of training and "distance" between members of stimulus sets appears necessary. Guidelines for controlled experimentation with the transpositon procedure are provided by Hebert and Krantz (1965).

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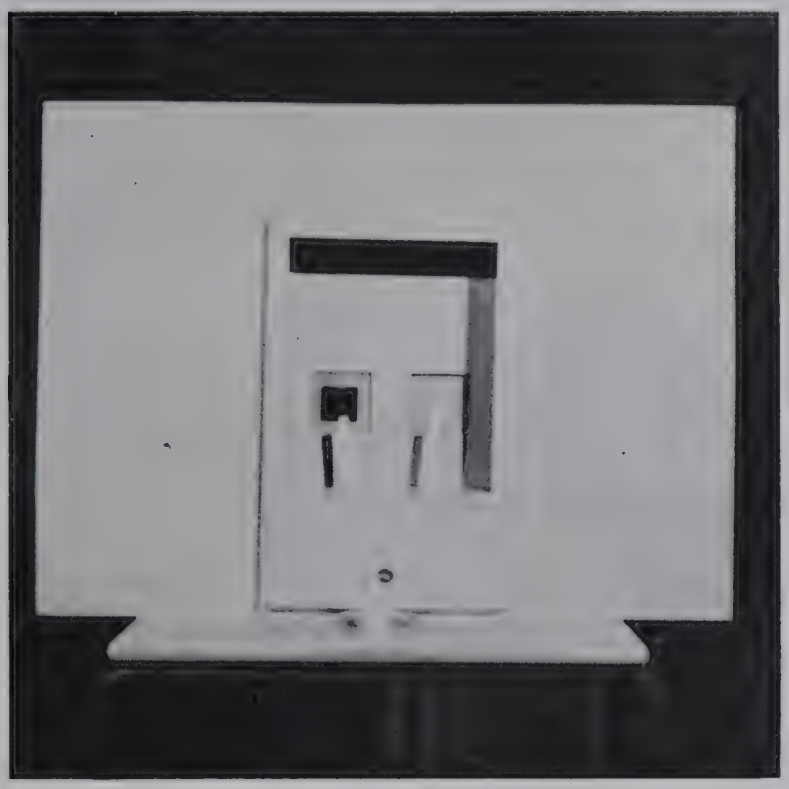
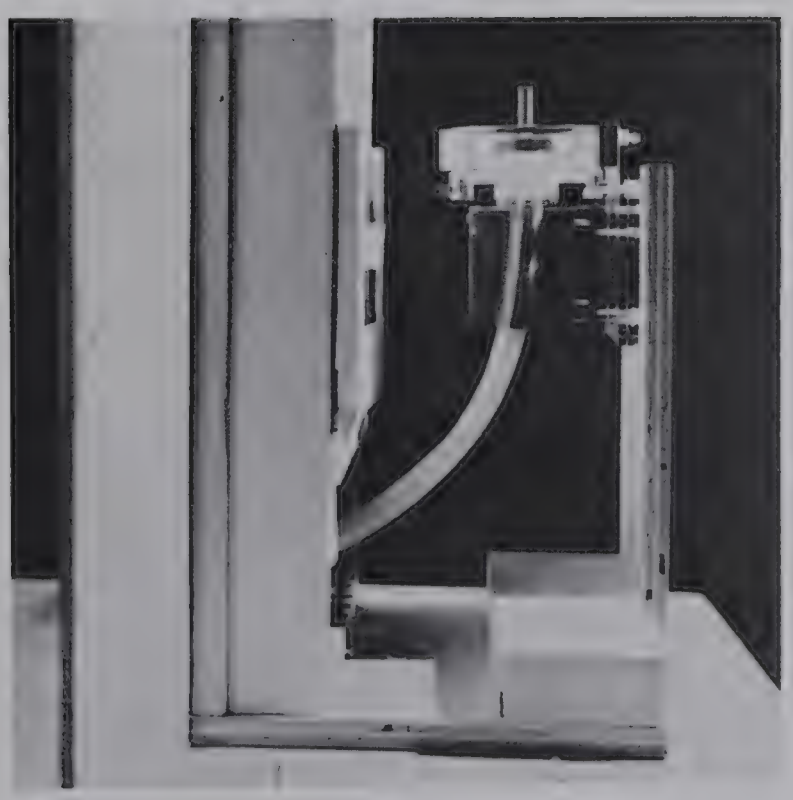
APPENDICES

APPENDIX A

Optional Reversal Shift Apparatus





APPENDIX B

Instructions for ORS

This is a game in which you will try to win as many candies as you can.

Now, (raise screen) look at these two pictures. One picture is the winning picture, the good one, and the other is the losing one. This is how you find out which one is the winner. See these two sticks? Each stick points to one picture like this. When we start the game, you will press the stick that points to the picture that you think is the winner. If you're right, a candy will drop out of this hole like this (activate dispenser). If you're wrong, no candy will drop out.

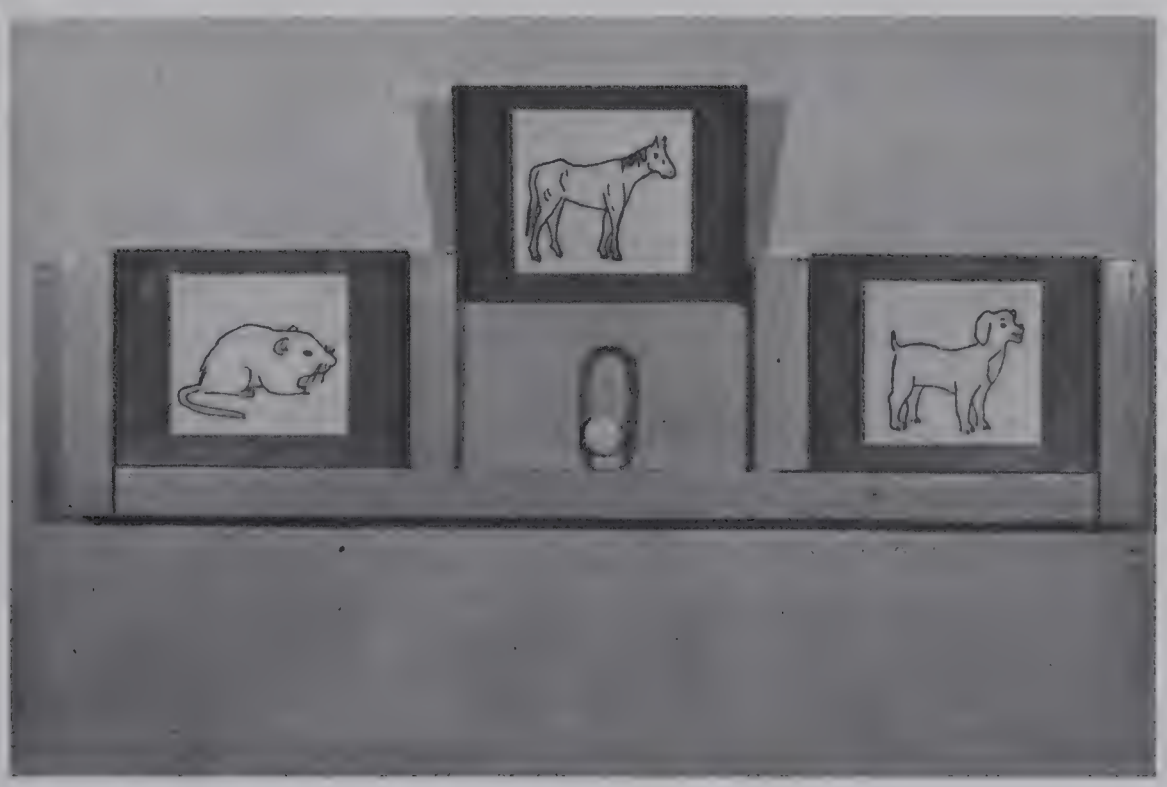
Each time I raise the screen, you will have <u>one</u> turn to press. Sometimes the winner will be on this side, and sometimes the winner will be on that side. If you try, you can win a candy every time you choose.

. . . Now press one of the sticks and see if it points to the winning picture.

(Every tenth response . . .) Don't forget to look at the pictures. Remember, you can win a candy every time you choose.

APPENDIX C

Transposition Task Apparatus



APPENDIX D

ORS Record Form

NAME _____ Test Date: _____

SCHOOL _____ GRADE _____ Birth Date _____

C. A._____

CONCEPT: _____

GROUP: _____

A----------

	1	2	3	4	5	6	7	8	9	10	61	62	63	64	65	66	67	68	69	70
__trials	11	12	13	14	15	16	17	18	19	20	71	72	73	74	75	76	77	78	79	80
	21	22	23	24	25	26	27	28	29	30	81	82	83	84	85	86	87	88	89	90
__ X	31	32	33	34	35	36	37	38	39	40	91	92	93	94	95	96	97	98	99	100
	41	42	43	44	45	46	47	48	49	50	101	02	03	04	05	06	07	08	09	10
	51	52	53	54	55	56	57	58	59	60	11	12	13	14	15	16	17	18	19	10

_____	1	2	3	4	5	6	7	8	9	10	41	42	43	44	45	46	47	48	49	50
	11	12	13	14	15	16	17	18	19	20	51	52	53	54	55	56	57	58	59	60
__trials	21	22	23	24	25	26	27	28	29	30	61	62	63	64	65	66	67	68	69	70
	31	32	33	34	35	36	37	38	39	40	71	72	73	74	75	76	77	78	79	80
__ X																				

__ rev	1	2	3	4	5	6	7	8	9	10
__ n-4	__	__	__	__	__	__	__	__	__	__

APPENDIX E

Transposition Record Form

NAME: _____ Test Date: _____

Birth Date: _____

SCHOOL: _____ GRADE ___ C. A. _____

CONCEPT: Small Large

GROUP: Control Experimental

-----INITIAL DISCRIMINATION----------

___trials 1 2 3 4 5 6 7 8 9 10

___ X 11 12 13 14 15 16 17 18 19 20

21 22 23 24 25 26 27 28 29 30

31 32 33 34 35 36 37 38 39 40

41 42 43 44 45 46 47 48 49 50

-----TRANSPOSITION A----------

___trials 1 2 3 4 5 6 7 8 9 10

___ X 11 12 13 14 15 16 17 18 19 20

21 22 23 24 25 26 27 28 29 30

-----TRANSPOSITION B----------

___ H __ __ __ __ __ __ __ __ __ __

___ D

___ M verbaliz. _____

_____

APPENDIX F

Qualitative Vocabulary Scale*

Class I Categorization and Synonym

The categorization response classifies the word by some definite scheme in terms of its universal characteristics. The synonym response may essentially be used to replace the object or idea with no or little change in the denotative aspects of the stimulus word.

e.g., diamond - a jewel
join - go together
spade - shovel
brave - courageous
nonsense - not true
nitroglycerine - an explosive
fable - a story
donkey - a horse-like mammal

Class II Essential Description

An essential description response must give the characterizing features of the stimulus word. If the stimulus word is abstract, the response must create mental imagery of the relevant situation. If the stimulus word is concrete (physically tangible), the response must differentiate between the stimulus word and members in its class.

e.g., donkey - a horse with long ears
fur - hair that cats have
diamond - an expensive stone

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* after Carson and Rabin, 1960.

Class III Essential Function

An essential function response must describe primary rather than peripheral usage or purpose of an object or an idea.

e.g., microscope - magnifies small things so you can see them
knife - something to cut with
bicycle - something you ride on

Class IV Example

An example response defines an object or idea in terms of its aspects or members.

e.g., letter - "a" is a letter
join - you join a club, be a member
diamond - in a ring, necklace
brave - lion tamer is brave to stand in front of a lion

Class V Vague Description and Vague Function

A vague description is a response that is not totally irrelevant but does not give the characterizing feature of the object or idea. A vague function response describes the peripheral rather than the primary usage or purpose of the object or the idea.

e.g., cushion - soft and colored
nail - to hammer
donkey - something to ride
nuisance - you're bad
spade - on a card

Class VI Error

The error response is totally irrelevant to the stimulus word. e.g., nonsense - not very good

Class VII Don't Know

A "don't know" response is a statement or a lack of statement designating that the S is unable to verbally define a word.

APPENDIX G

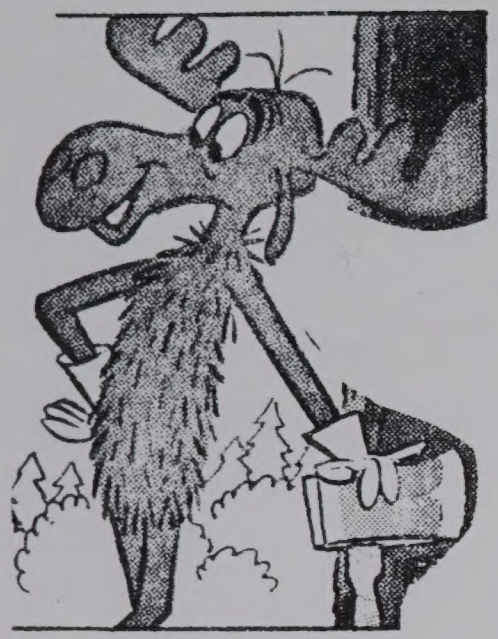
Stimulus Material for Language Study--

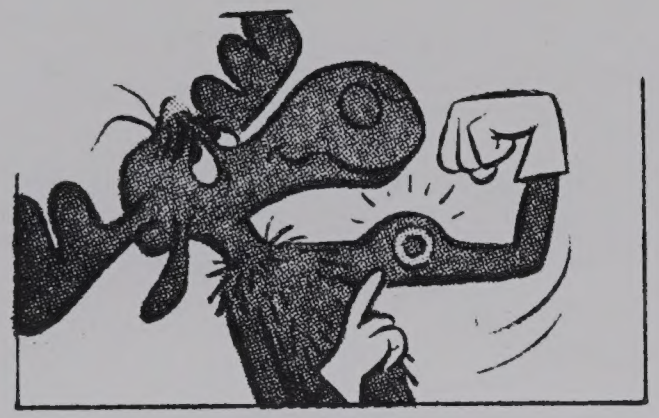
Classroom Picture

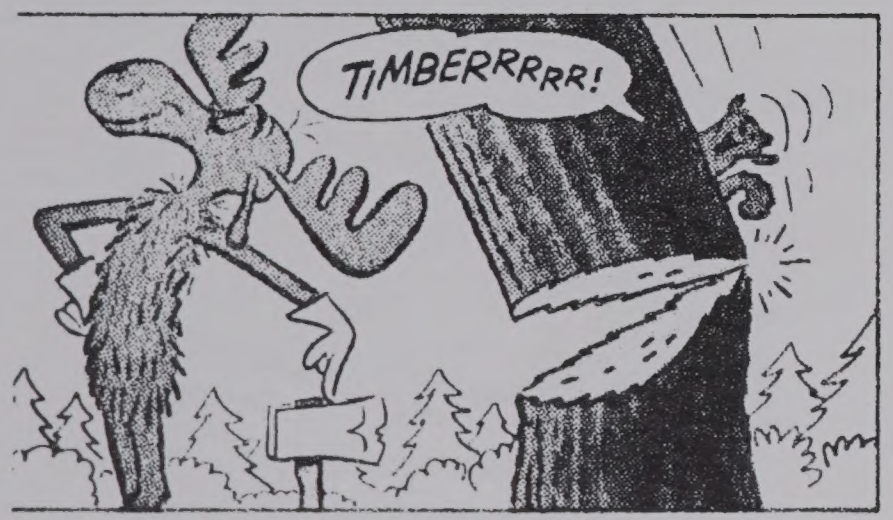
APPENDIX H

Stimulus Material for Language Study--

Comic Strip






TIMBERRRRR!


CRASH!


SHH